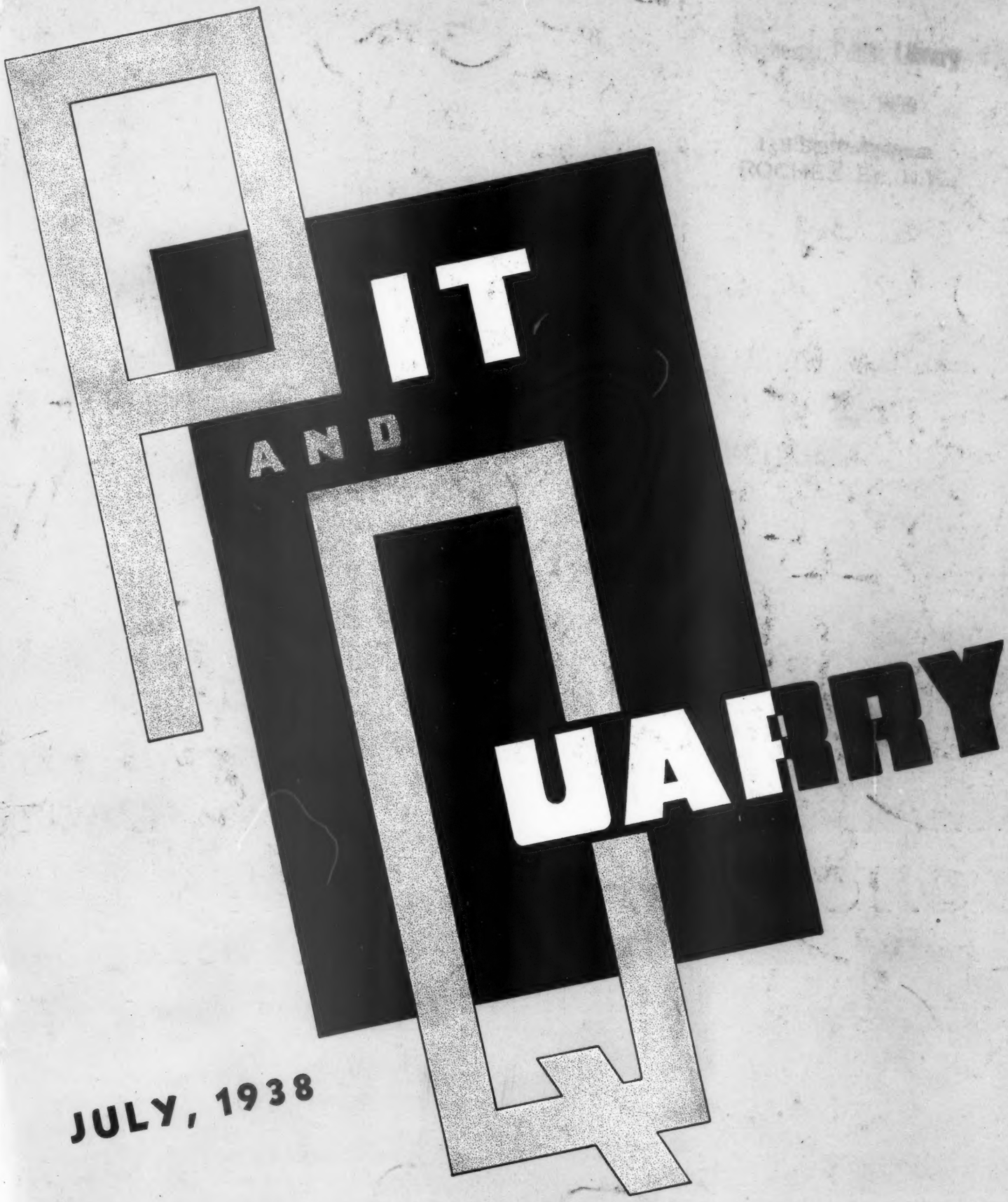
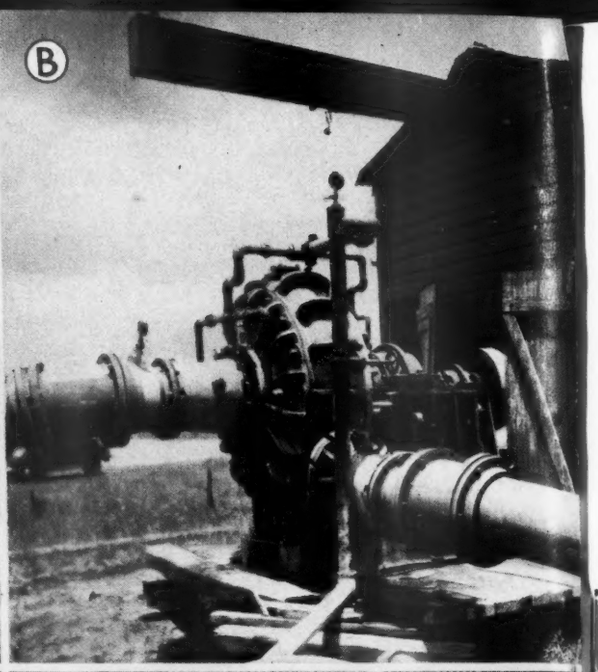
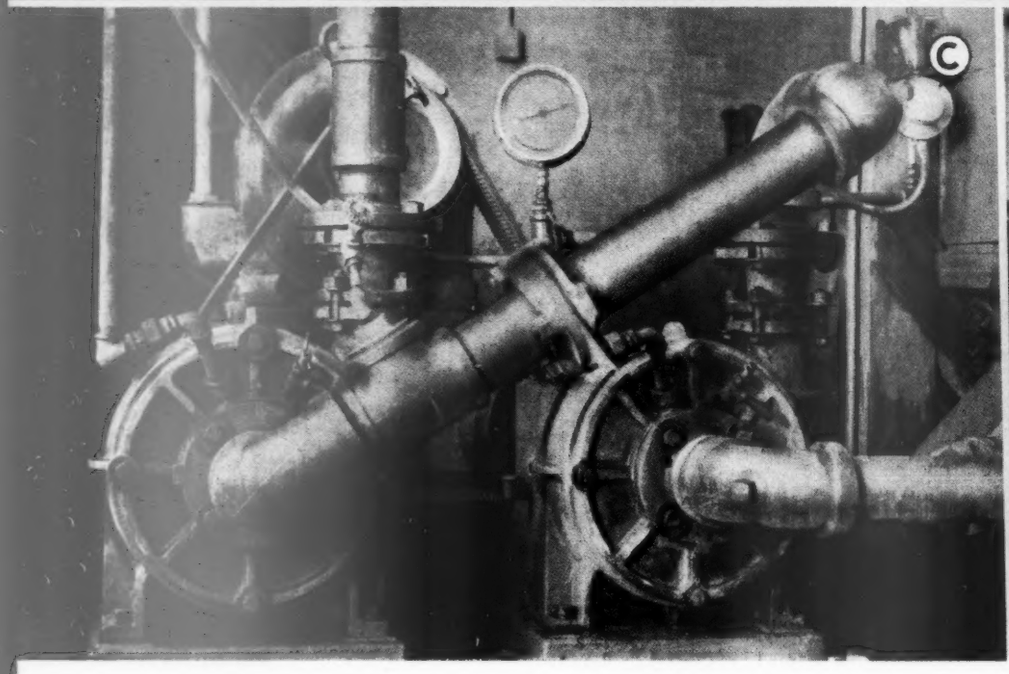
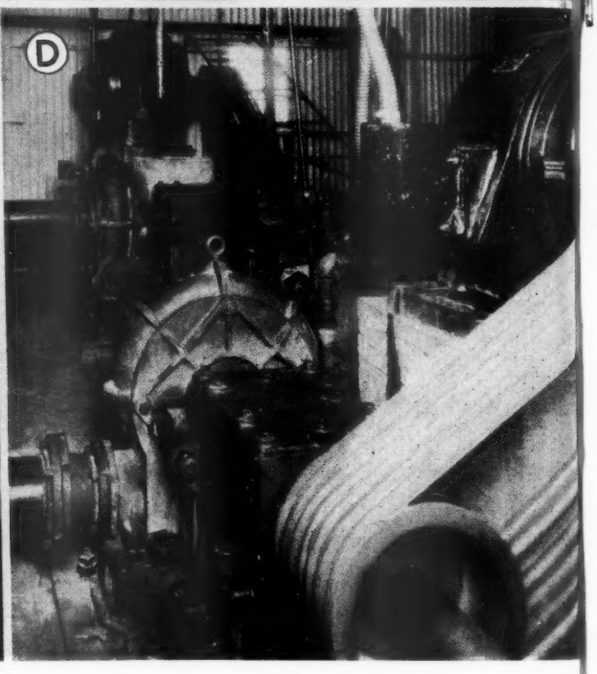


JULY, 1938

Puerto Rico's New Cement Plant . . . Recent Cement-Mill Improvements . . . Studies on the Elimination of Cement-Stack Dust . . . Concrete Units Faced with Natural Stone







LONG-DISTANCE PUMPING

Two Stage or Booster

One of the two Maximix Rubber Side Plate Liners used in Hydroseal Dredge Pumps, twisted to demonstrate its flexibility. Maximix outlasts metal. Replacements are inexpensive and easy.

Hydroseal Dredge Pumps are built in all sizes from 2" up to 12", 14", 16" or larger. In some installations, one large pump proves most satisfactory for long-distance pumping. Often, however, a booster pump is better, as shown in Photo B which is, in this case, 1700 feet from the dredge pump A and pumps 4000 G.P.M. 3000 feet through a 14" line. In other conditions, two stage pump installations as shown in Photos C and D are more economical, since both pumps are together with the discharge of one pump piped to the suction of another. If your conditions require long-distance pumping, the advantages of the Hydroseal Principle introduce substantial installation and operating economies. Send for Catalog No. 937.

HYDROSEAL MAXIMIX RUBBER PROTECTED DREDGE PUMPS

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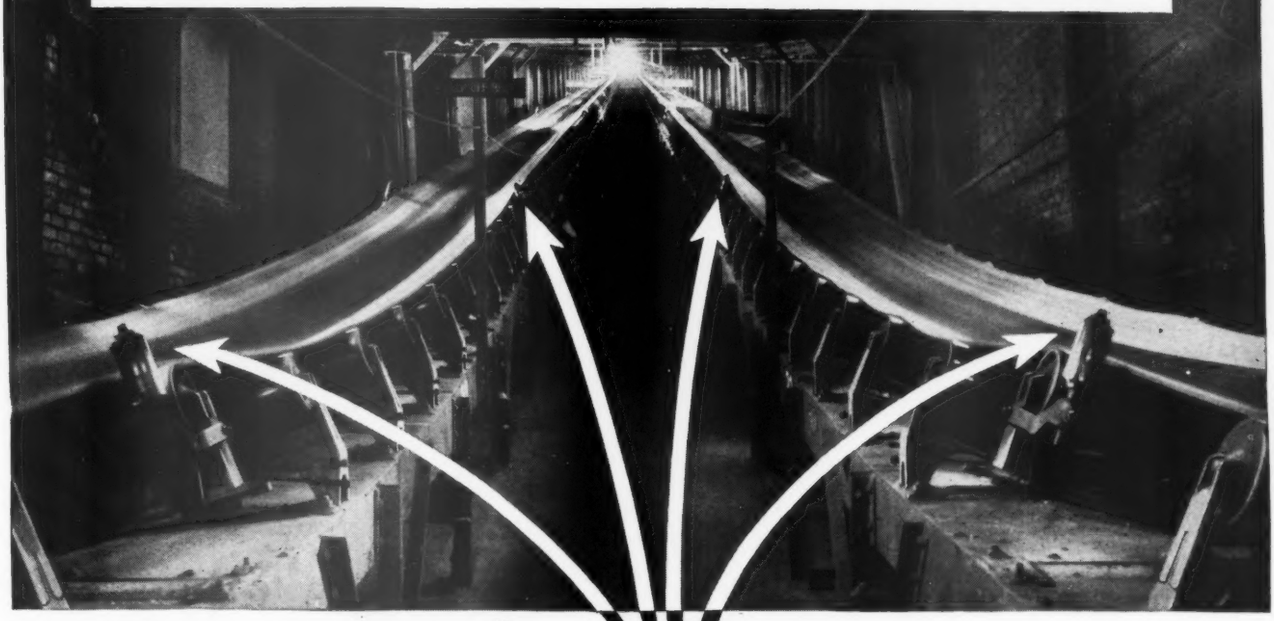
115 South Avenue
ROCHESTER, N. Y.

Economize with LINK-BELT ANTI-FRICTION CONVEYORS



These are the Link-Belt Positive Self-Aligning Idlers, spaced at suitable intervals, that automatically maintain the conveyor belt in a central carrying position without injury to its edges.

The many Anti-Friction Idlers used on the conveyors illustrated are Link-Belt Type 40. Type 41 return-run idlers are employed. There were 20 conveyors on the order, all Link-Belt equipped.

● Good idlers are of vital importance to satisfactory belt conveyor operation. They preserve the belt, reduce power requirements and maintenance expense, and give long trouble-free service. Link-Belt Anti-Friction Idlers are the product of years of specialization in this field. Among the more recent developments is the Link-Belt Positive Self-Aligning Idler for automatically maintaining the proper position of belt. Submit your conveyor problems to Link-Belt, and let us furnish you the style and type of equipment that will bring you the best results. Catalog sent on request.

THE SYMBOL OF QUALITY · LINK-BELT · LB

LINK-BELT COMPANY

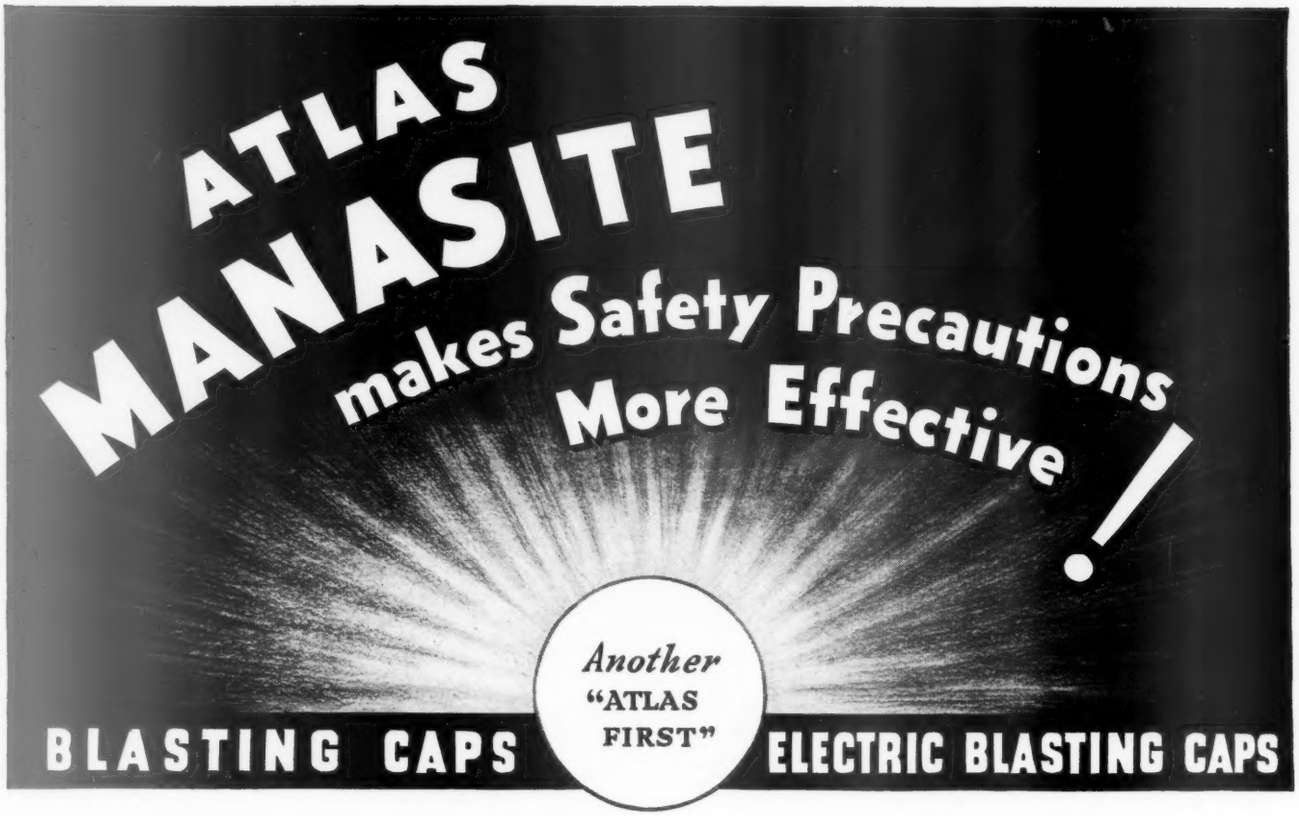
The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power

CHICAGO INDIANAPOLIS PHILADELPHIA ATLANTA SAN FRANCISCO TORONTO

Offices located in principal cities

7234-B

PIT AND QUARRY, July, 1938. Vol. 31, No. 1. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post-Office at Chicago, Ill., under the act of March 3, 1897.



With the introduction of the new Atlas Manasite Blasting Caps and Electric Blasting Caps, safety precautions in blasting operations become more effective than ever.

Any operation in blasting practice demands rigid maintenance of safety precautions, but Atlas Manasite Detonators widen materially the margin of safety by lessening the possibility of accident from inadvertent mishandling.

Through an exclusive, patented Atlas method of using nitro-mannite as an initiating compound, Atlas Manasite Detonators indicate a substantial reduction in sensitivity to impact and friction—but possess full detonating efficiency.

Careful tests—the falling weight test, the sand friction test, the piercing test, heat and flash tests—have indicated a much greater margin of safety than is possible with ordinary detonators.

With Atlas Manasite Blasting Caps and Electric Blasting Caps, there is greater safety in handling for the worker with explosives, and far less chance of accident through handling by irresponsible people.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

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ATLAS

EXPLOSIVES

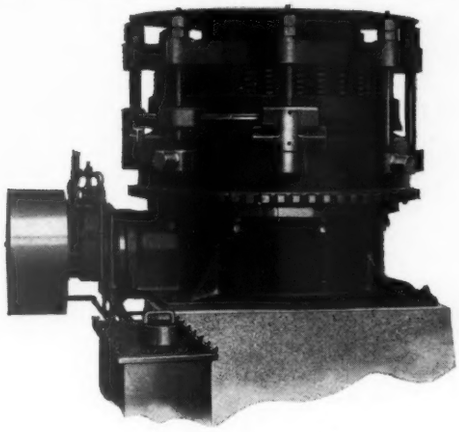
CHEMICALS ATLAS EXPLOSIVES

Plus PERFORMANCE *minus* MAINTENANCE

finer crushing—a more cubical product

higher speed and greater tonnage

better built for longer life and lower up-keep



TELSMITH GYRASPHERE CRUSHER

takes an unlimited and unregulated choke feed when other secondary crushers can't. Like a mortar and pestle... only inverted for easy discharge ... the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect *cubing* action. A finer, faster secondary crusher that takes less power ... and less up-keep.

Write for descriptive Bulletin Y-15

You get more crushing strokes per minute with the Telsmith-Wheeling Jaw Crusher...and greater reduction in *one* process. Roller bearings almost double capacity, cut power consumption per ton, reduce up-keep. Because its frame and jaw are massive steel castings, its shaft a big steel forging—Telsmith is almost a permanent investment. Adjustable for a wide range of product sizing. Seven sizes. *Write for Bulletin W-15.*

Sand, gravel, crushed rock, ore, coal—Telsmith Pulsator screens 'em all, wet or dry, and does it *right.* Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire, regardless of load. Telsmith builds in greater value, longer life and lower up-keep with the toughest alloy steels, anti-friction bearings and special seal protection for working parts. Single, double or triple deck; 11 sizes. *Write today for Bulletin V-15.*

TELSMITH-WHEELING JAW CRUSHER

TELSMITH PULSATOR

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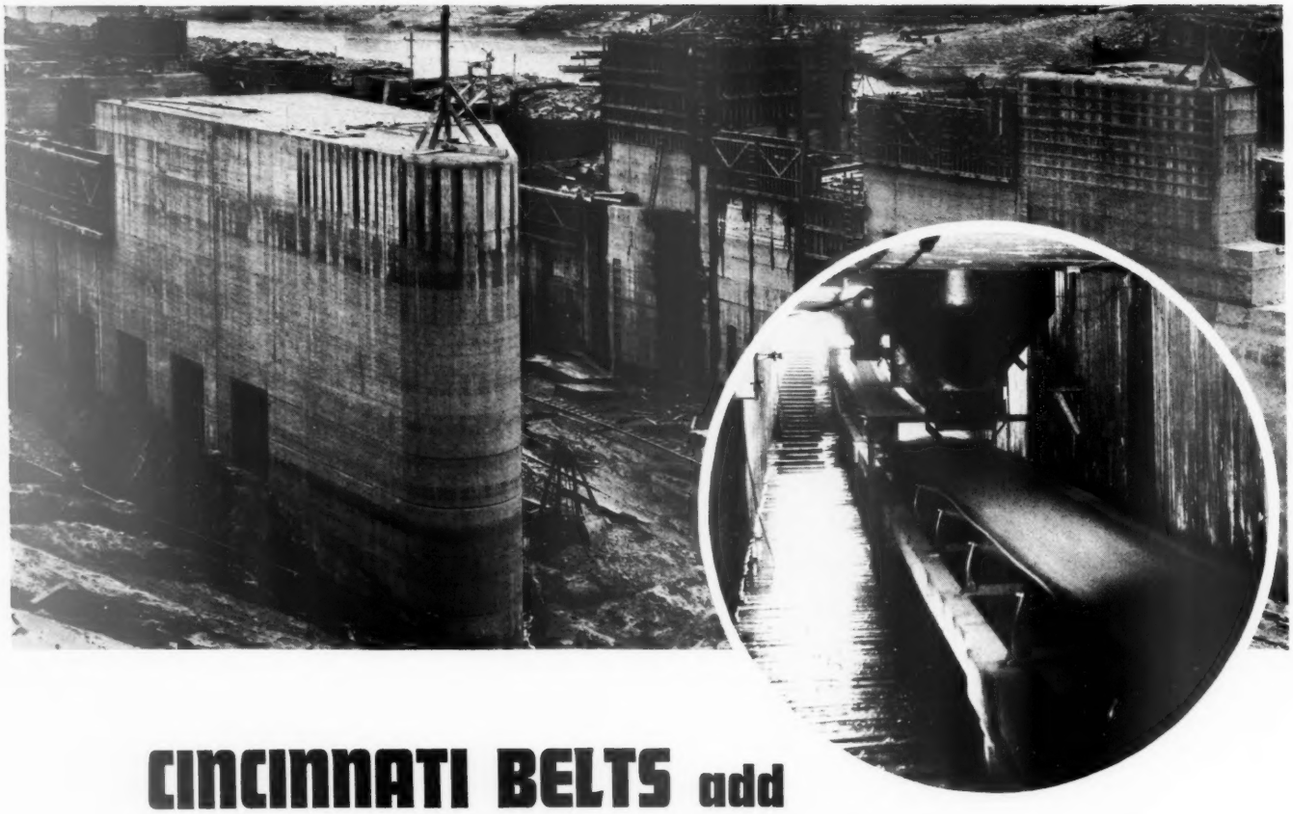

CINCINNATI BELTS add SPEED... EFFICIENCY to conveying concrete and aggregate for Tuscaloosa Dam . . .

The rapid and economical handling of 180,000 cubic yards of aggregate and concrete for the construction of Tuscaloosa Lock and Dam at Tuscaloosa, Alabama, proved a major problem . . . this was solved with Cincinnati Conveyor Belts. Their smooth, uninterrupted performance in this grueling, belt testing work confirms again their amazing stamina and ability.

Cincinnati Belts were selected for this job, as for hundreds of others, because they are known to stand up to a volume of tonnage that reduces the belt cost per ton conveyed. If you have sand, gravel, crushed rock, cement or other materials that require low-cost handling, it will pay you to investigate Cincinnati Belts. A "Cincinnati" man will be glad to discuss your belt problems with you.

THE CINCINNATI RUBBER MFG. CO. - CINCINNATI, OHIO

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CINCINNATI

CONVEYOR . . . ELEVATOR BELTS

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CEMENT EQUIPMENT

During a period of more than two decades, Traylor has won leadership in the manufacture of Rotary Kilns, Coolers, Dryers, Ball and Compartment Mills, for producing Portland cement, and for many other process industries. We have pioneered so many improvements in these units, to solve operators' problems almost as soon as they arose, that a Traylor has come to be known as "tomorrow's machine today."

In recent years we have developed a technique in electric welding, and created special handling equipment to do the work, that enables us to supply still better cement manufacturing machinery than the high quality which we have furnished heretofore.

Our facilities are for the sole use of our good customers, and all cement manufacturers and process industries are invited to use them to the full. Literature and consultation are available immediately, upon request. Write us today, about your problems and needs.

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ALLENTOWN, PENNA., U.S.A.

More Work from Explosives with CORDEAU·BICKFORD

Because Cordeau-Bickford Detonating Fuse is in direct contact with the entire charge, giving every cartridge in the hole the maximum force and effectiveness of a primer cartridge. Regardless of whether the charge is continuous or broken, the result is better fragmentation, with obvious savings in time and effort required for removal of material following every Cordeau-detonated blast.

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CORDEAU·BICKFORD *Detonating Fuse*

Simplicity
Efficiency
Durability
Economy

Breaking All Records

LOADING

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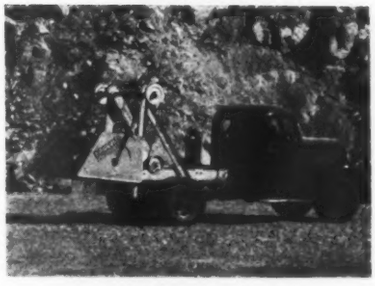


DUMPING

DEMPSTER DUMPSTER

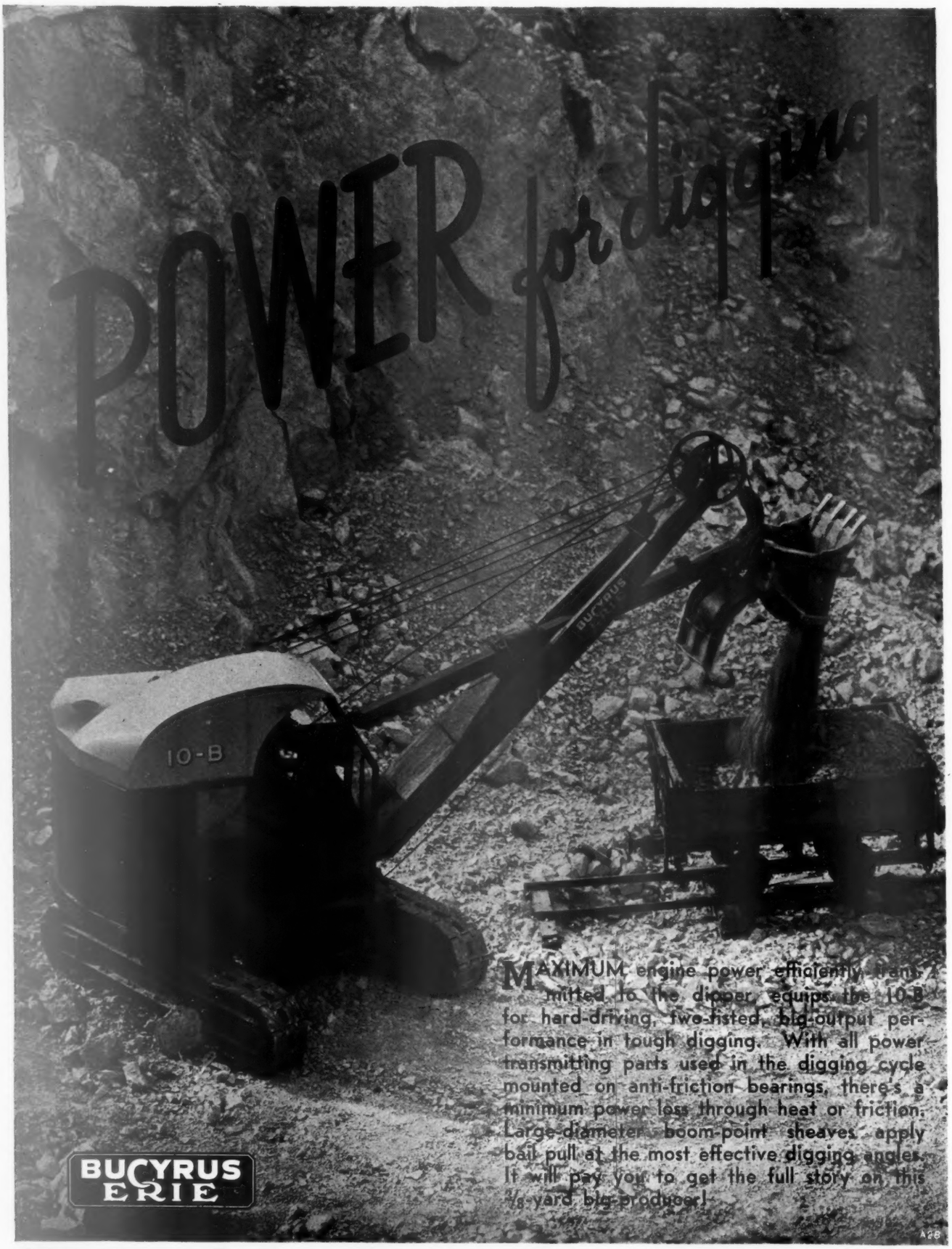
Clock your time on any material handling job —before and after using the DEMPSTER-DUMPSTER—and you will be amazed at the enormous savings made possible by this modern method of moving dirt, rock, aggregate or any other material that is loaded by hand.

You simply spot the containers at convenient loading points—make pick-ups as fast as filled —then haul and dump on a continuous schedule. No waiting trucks—no idle men—no waste time. Every dollar paid out, brings back its full value in work-hours. You can turn "losing" jobs into profitable operations with the DEMPSTER-DUMPSTER.

This is the original, proved method of cutting the cost of hand loading. Write for details. Sizes range from—1 cu. yd. to 6 cu. yds.

DEMPSTER BROTHERS, Inc. KNOXVILLE TENNESSEE

NEW YORK, N. Y. NASHVILLE, TENN. CHICAGO, ILL.

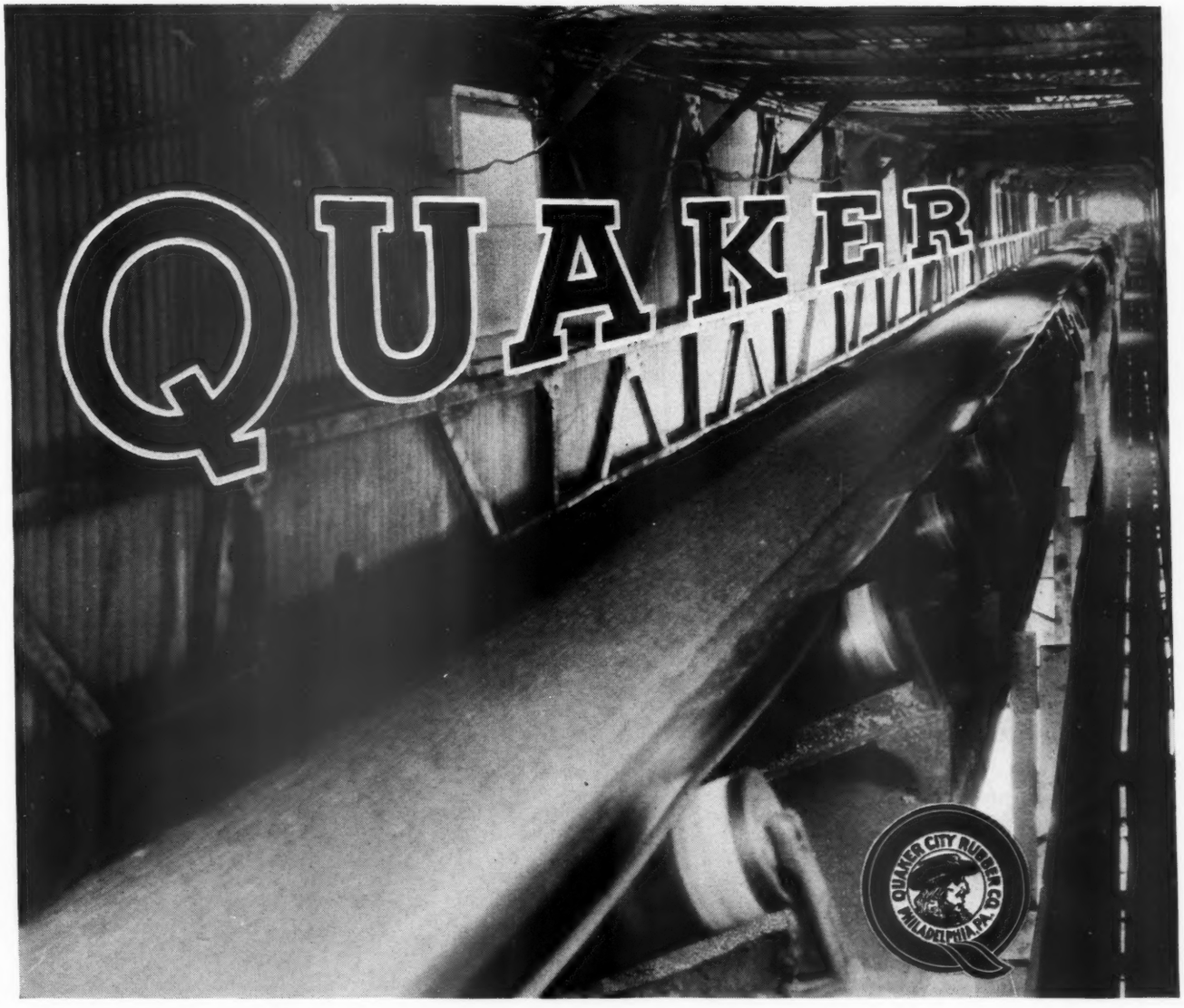


MAXIMUM engine power efficiently transmitted to the dipper equips the 10-B for hard-driving, two-fisted, big-output performance in tough digging. With all power-transmitting parts used in the digging cycle mounted on anti-friction bearings, there's a minimum power loss through heat or friction. Large-diameter boom-point sheaves apply bail pull at the most effective digging angles. It will pay you to get the full story on this ⅜-yard big-producer!

A28

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



CONVEYOR BELT

handling tons of gravel economically

This belt, 770 feet long, 36 oz. 7 ply, is conveying tons of gravel economically for one of the leading mid-western gravel companies.

Equip your plant with Quaker Belts. The belts that are made for hard work . . . the kind of rough usage where gravel, crushed rock, stone and similar abrasive materials are conveyed.

Let us estimate on your belts. Samples and quotations gladly submitted.

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Pit and Quarry Handbook, besides being the recognized authority on the production of nonmetallic minerals, also contains a complete Directory of Producers, an Equipment Trade-Name Index, and the Consolidated Catalogs of the leading equipment and machinery manufacturers. Somewhere in its 838 pages (1938 edition) you can find the answer to your problem. For example:

DO YOU KNOW . . . .

- Who makes Broncho suction hose? Zintex screen cloth? Supremus conveyor belting? Keystone lime kilns?
- How many crushed-stone producers are located in Kansas?
- Who is the purchasing agent of the Crosby Sand & Gravel Co. of Seattle?
- What percentage of sand and gravel was shipped by motor truck in 1936?
- The names of 14 manufacturers of hammer pulverizers? Seven leading makers of automatic weighing machinery? Which shovel manufacturers furnish Diesel-powered equipment?
- What six advantages have large-diameter drill holes over small holes?
- How many fatal accidents occurred in the cement industry in 1933?
- In what special applications are direct-current motors advantageous?
- What five states have more than half the ready-mixed-concrete plants?
- What are the operating advantages of a full-revolving excavator?

When questions like these come up . . . as they are bound to almost every day . . . you can get the answer in Pit and Quarry Handbook. Copies are distributed free of charge to recognized producers of nonmetallic minerals. To all others a charge of $10 per copy is made.

PIT AND QUARRY HANDBOOK

538 SOUTH CLARK STREET CHICAGO, ILLINOIS

WHY PAY FOR ROADS when you buy hauling units?

ATHEY FORGED-TRAK TRAILERS MAKE THEIR OWN ROADS

When you think of hauling with trucks, you must think of roadways—not just any old roadway, but the smooth, well-maintained roadway necessary for truck life and speed. And you must think of maintaining those roads—paying for constant upkeep. You don't need roads when you haul with Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel Tractors. Athey Forged-Trak Units make their own roads—actually improve the roadbed with their broad tracks! For lower hauling costs see your "Caterpillar" dealer or write us!

YOU CAN LAUGH AT BAD WEATHER •

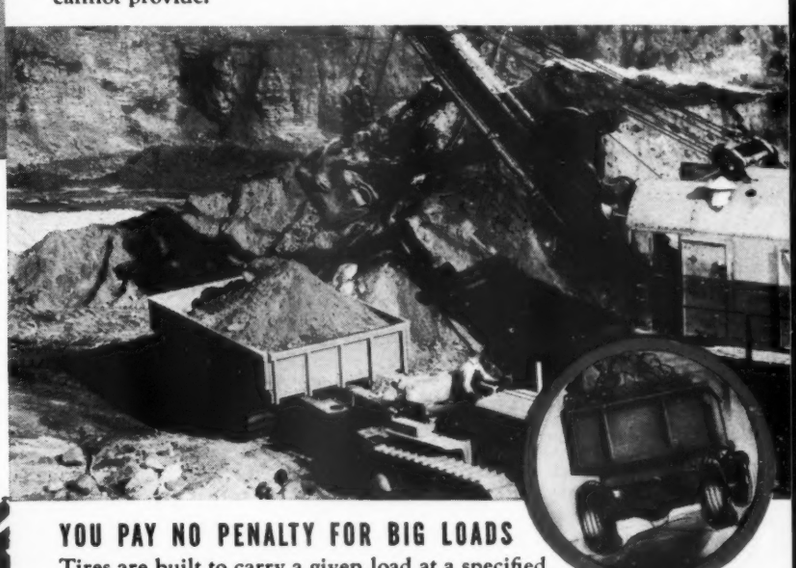
Trucks are affected by weather conditions, particularly at the dump. Athey Forged-Trak Trailers work regardless of bad weather. Their wheels are non-miring—they can operate efficiently on slippery, bumpy, rutted or uneven surfaces.

SAY GOODBYE TO TIRE FAILURE • • •

Trucks are subject to interruptions through tire failure—but you don't pay high tire replacement and repair cost when you use Athey Forged-Trak Trailers. In addition, these trailers have the frame and body strengths which trucks cannot provide.

GET RID OF HIGH MAINTENANCE • •

Big loads, washboard roads and slippage play havoc with truck tires, frames and bodies. You need never pay such high maintenance costs with Athey Forged-Trak Trailers.



YOU PAY NO PENALTY FOR BIG LOADS

Tires are built to carry a given load at a specified inflation—either overloading or under-inflation immediately imposes a penalty of shorter life. Athey Forged-Trak Trailers *absorb* the overload caused by road inequalities and loading impacts.

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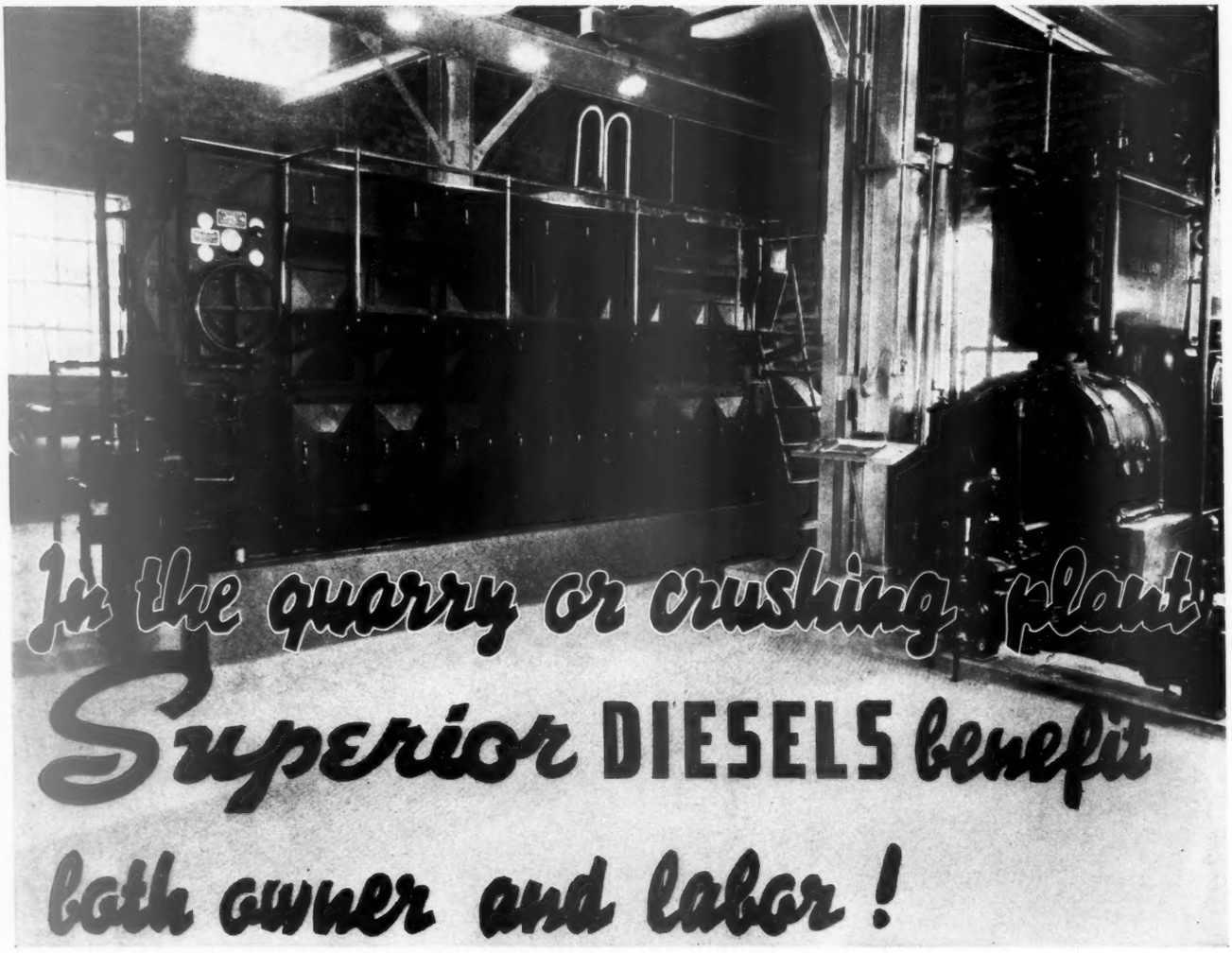
ATHEY

FORGED-TRAK WAGONS AND TRAILERS

REG. TRADE-MARK



A typical, money-saving, 560 H. P., Superior Diesel installation in a quarry and crushing plant in the limestone district of Missouri.

Unlike many types of modern machinery, a Superior Diesel is beneficial to labor and makes more work.

Along with reduced power cost, more uniform and dependable service, and higher rate of production for plant owners comes a requirement for power plant labor and steadier work for others due to reduced cost of production which permits plants to operate at a profit and which opens up new markets for cheaper products. We KNOW there are plants which cannot afford to operate without Diesel power. Is yours one of them?

Our engineering service is free to all who need it and it embraces experience in this industry.

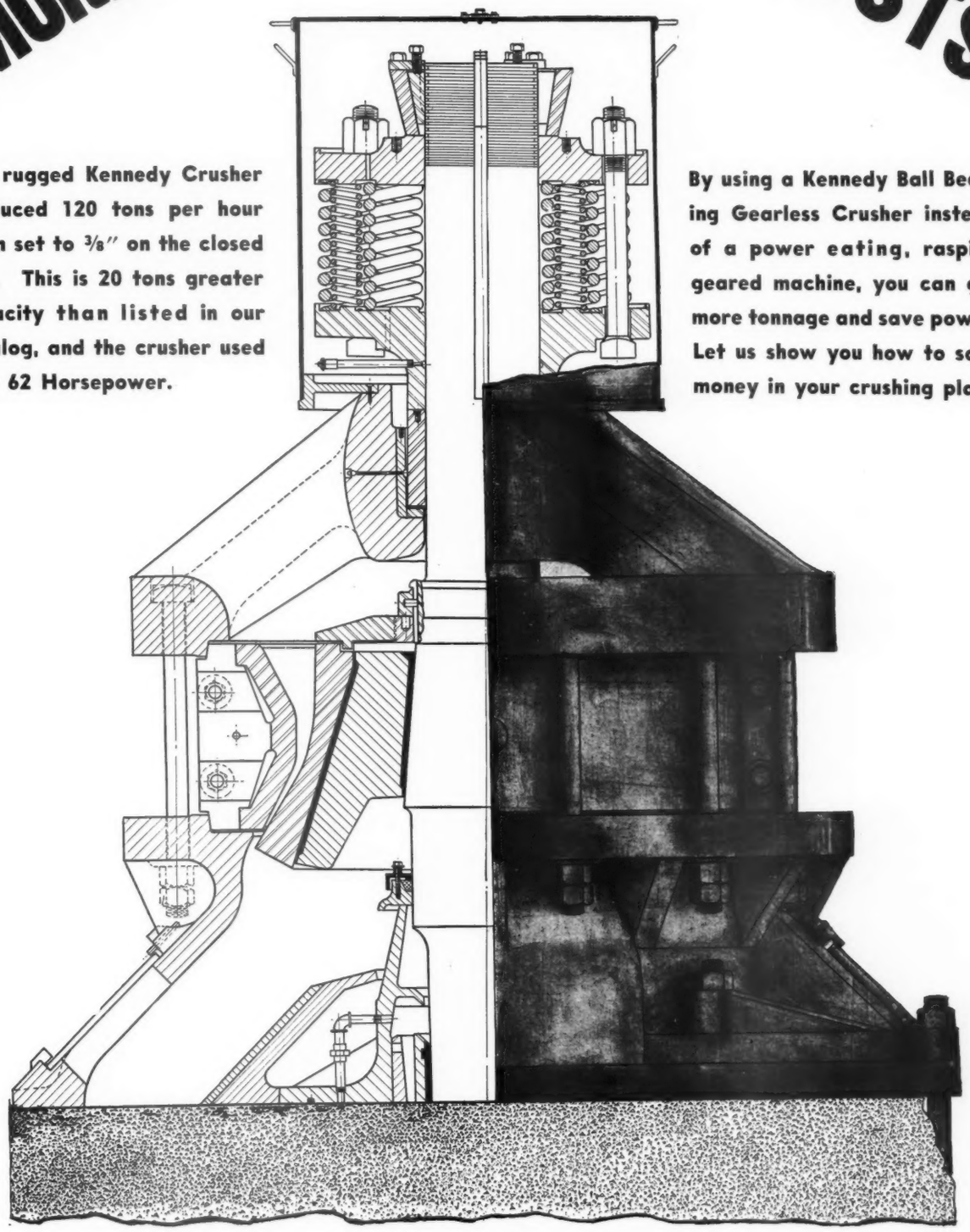
THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

MORE TONNAGE–LOWER COSTS

This rugged Kennedy Crusher produced 120 tons per hour when set to 3/8" on the closed side. This is 20 tons greater capacity than listed in our catalog, and the crusher used only 62 Horsepower.

By using a Kennedy Ball Bearing Gearless Crusher instead of a power eating, rasping geared machine, you can get more tonnage and save power. Let us show you how to save money in your crushing plant.

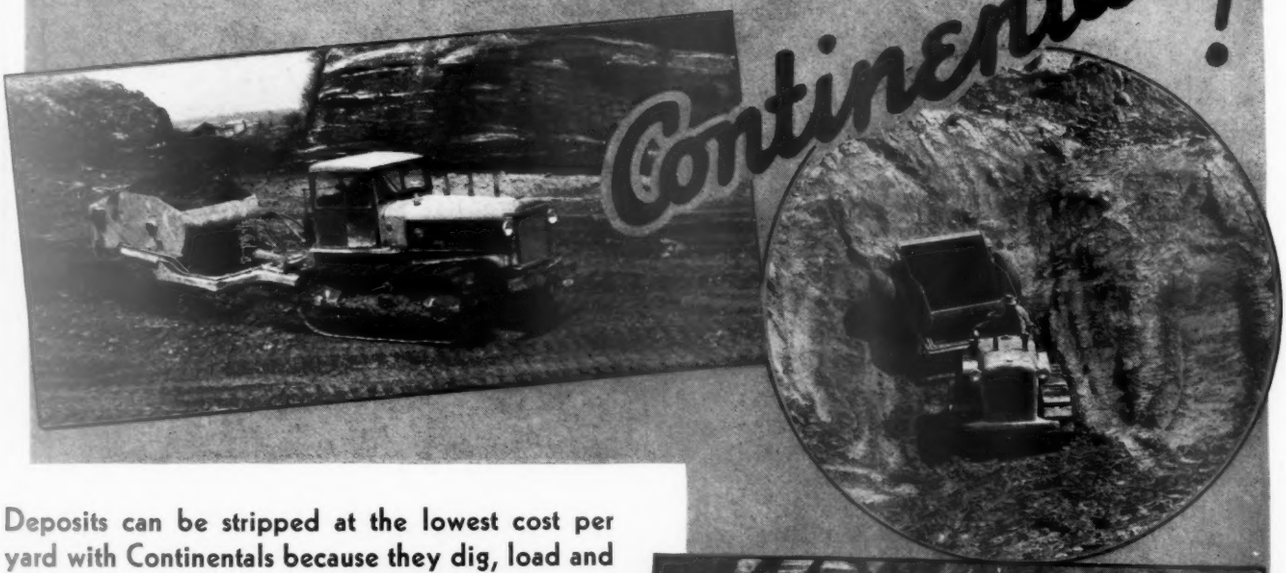


WRITE FOR BULLETIN NO. 35

Sales agents in all principal American cities. . . . Wire us collect for the name of nearest agent. Also manufactured in Canada, Australia, France and England.

KENNEDY-VAN SAUN MFG. & ENG. CORP., 2 PARK AVE., NEW YORK, N. Y.

GET STRIPPING COSTS DOWN to Bed Rock with Continentals!



Deposits can be stripped at the lowest cost per yard with Continentals because they dig, load and haul in one operation—while they're digging and loading they're on their way to the dump. They back-dump like a truck out of the way of the wheels, over a bank, against a wall, spotting the load exactly where it's wanted.

They quickly hog up gumbo, sand, wet sticky clay, shot rock, imbedded rocks, roots—anything the tractor can pull through; and as fast as it can pull—in layers up to a foot thick, rolling it up onto the carrying apron out of the way of incoming material. They eliminate rooting, bulldozing and shoveling. They turn short and back without zigzagging. They spread, grade and level; and are used for building ramps and roads.

Operation is by hydraulic control. No complicated counterbalances, spring mechanisms or winches to wear, stick, or get out of order. Less pulling resistance because of two-wheeled stability. Get the facts—check the Continental way against your present costs.

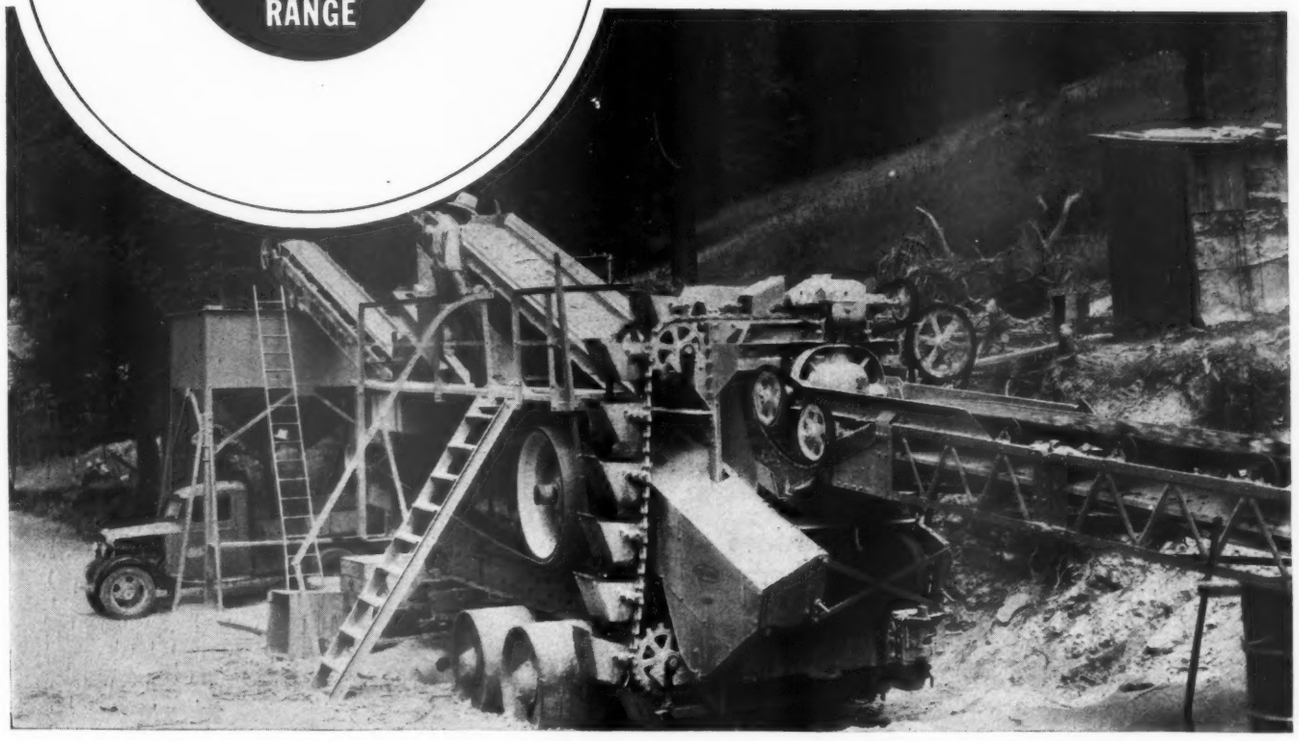
Made in 4, 5, 7 and 10 yard sizes mounted on low pressure tires or crawlers. Sold and serviced by Allis-Chalmers dealers everywhere.

CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
TRACTOR EQUIPMENT DIVISION
14400 RAILROAD AVENUE - - - - EAST CHICAGO, INDIANA

CONTINENTAL WAGON SCRAPERS

EXPAND

Your Field of Profitable Operation with an A-W Portable



● 51,449,000 tons of gravel . . . 65% of the tonnage used on paving operations in 1936 . . . were produced by non-commercial crews, says the U. S. Bureau of Mines. Here's a rich field . . . ripe for cultivation by commercial producers equipped to compete beyond the economical hauling zone of a fixed plant.

With an A-W Portable as an auxiliary to your fixed plant you're prepared to reach out anywhere for this profitable added volume. Your present market limitations are expanded many times. Your sales and profit opportunities are multiplied.

Records show A-W Crushers can often produce material for less than the cost of fixed plant production. This saving plus the savings in freight and truck haulage make one or more of these plants profitable for you to own.

Big in capacity, powerful and efficient . . . the A-W crushing and screening plant is built to deliver material in volume at the job. Easly set up for operation anywhere in a few hours . . . this self-contained unit is readily transportable on steel or pneumatic tired wheels.

Unusually deep jaws, extra strong oversize shafts, and oversize roller bearings permit high primary breaker crushing speeds for big output. The secondary crusher (roll or jaw) has the same honest construction throughout, assuring continuous operation at top speed.

Judge for yourself the market possibilities of this job tested portable equipment. Mail the coupon for full details.

AUSTIN-WESTERN ROAD MACHINERY CO.
1841 Barrows St., Aurora, Ill.

AUSTIN-WESTERN

The Austin-Western Road Machinery Co.,
1841 Barrows St., Aurora, Ill.
Please send literature on A-W Portable Crushing Plants

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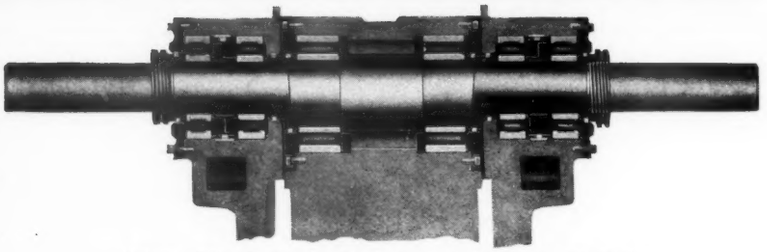
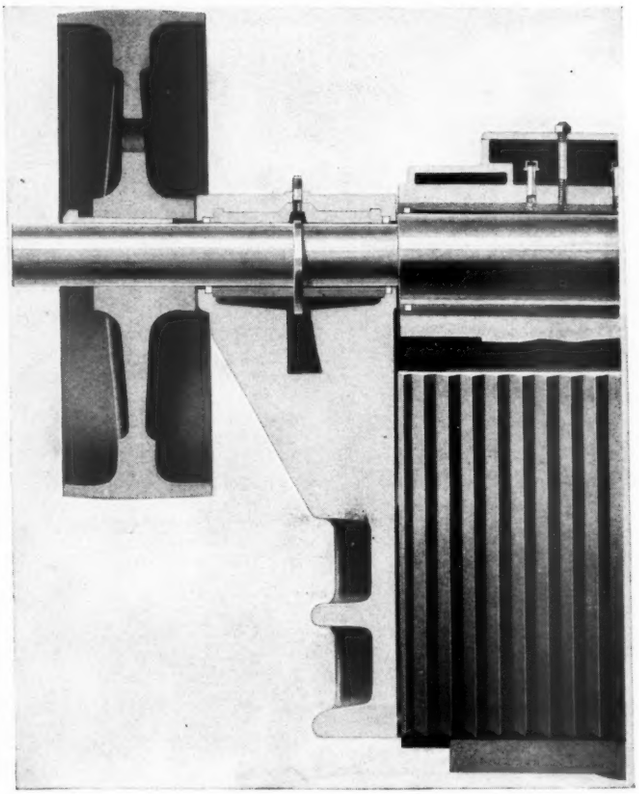


Universal Roller Bearing Jaw Crusher's six large bearings, two on the pitman and two on each side, have proved superior to any other bearing arrangement regardless of operating conditions. The evidence is in our files.

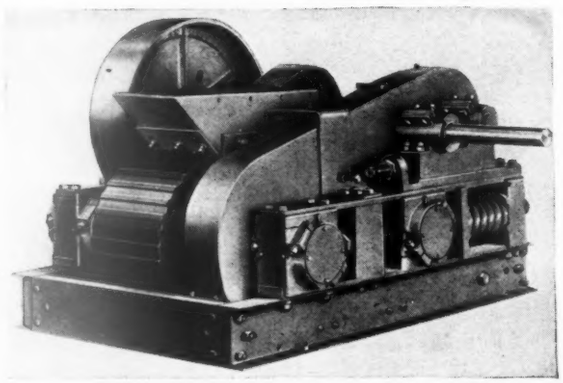
Let's take a Universal Jaw Crusher apart. You'll find parts designed to give the longest possible service with the least amount of maintenance. Highest grade materials accepted by the engineering fraternity as best for the work intended in every part. Each part, right on down to the nuts and bolts, ruggedly made for long time heavy duty service.

You'll find bearings that really stand up under the grind—six large bearings on the roller bearing model—two on the pitman and two on each side; bronze bearings that protect the shaft over its entire length on the bronze bearing models. And you'll find the fast acting speed-geared product size adjustment ratchet; the readily replaced manganese steel crushing jaws; simple lubrication that reaches every inch of bearing surface; to name only a few of the details in which Universals excel.

You'll find everything a crusher should have to provide constant, low cost material; and most of them only on Universals!



The large bronze bearings on Universal Crushers reach clear across the shaft from fly wheel to fly wheel. Large oil rings and commodious oil chambers provide dependable lubrication. Bearings on all Universal Crushers are sealed against dust.



Universal Roll Crushers are also available with bronze or roller bearings. Here, too, Universal's years of field study and advanced engineering design are evidenced by the large bearings, a simple method of mounting the roll shell, chain or star gear drive, and easy product size control.

Send for bulletins on Universal Jaw Crushers, Roll Crushers, or Stationary, Portable and Semi-Portable Crushing, Screening and Loading Plants and accessory equipment.

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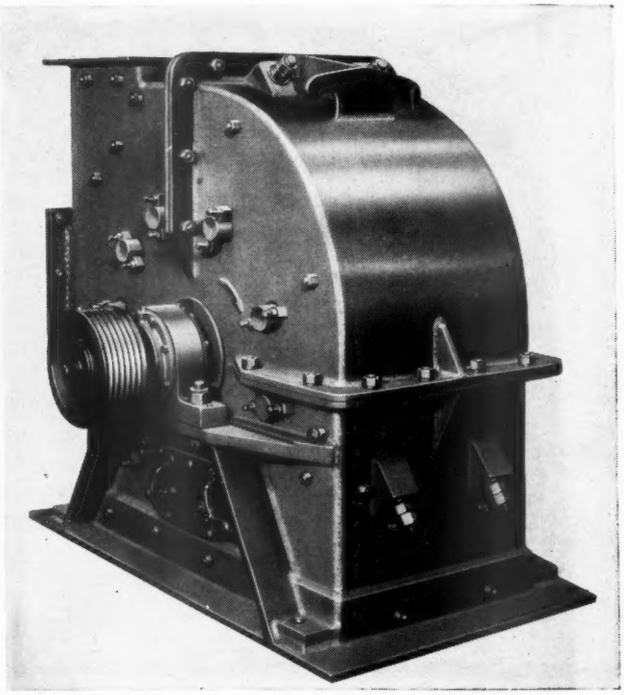

A MULTI-IMPACT Pulverator, feed throat opening 11½" x 25". Pulverators are built in seven sizes, with feed openings from 4½" x 9" to 11½" x 49".

*In Allis-Chalmers MULTI-IMPACT Pulverators, most of the work is done in the upper part of the machine. The hammers revolve upward to shatter the material to be crushed, hurling it against a series of involute breaker plates for further reduction. By the time the material reaches the bottom, most of it is fine enough to go through the grates. That's the reason *why* drag is lessened . . . *why* wear is reduced . . . *why* you can save on service costs!

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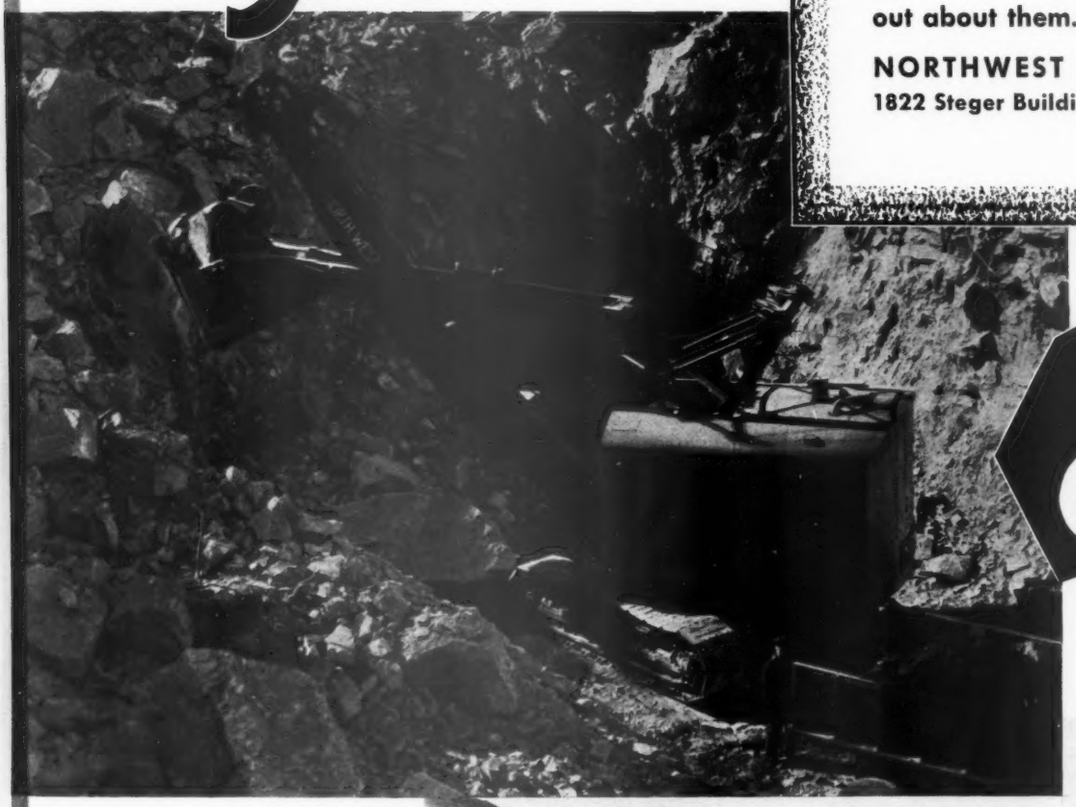

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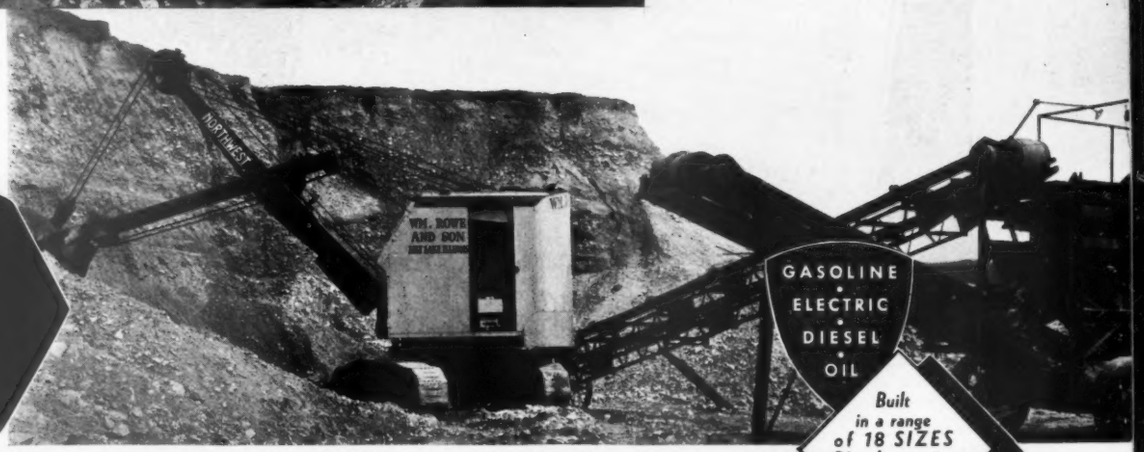
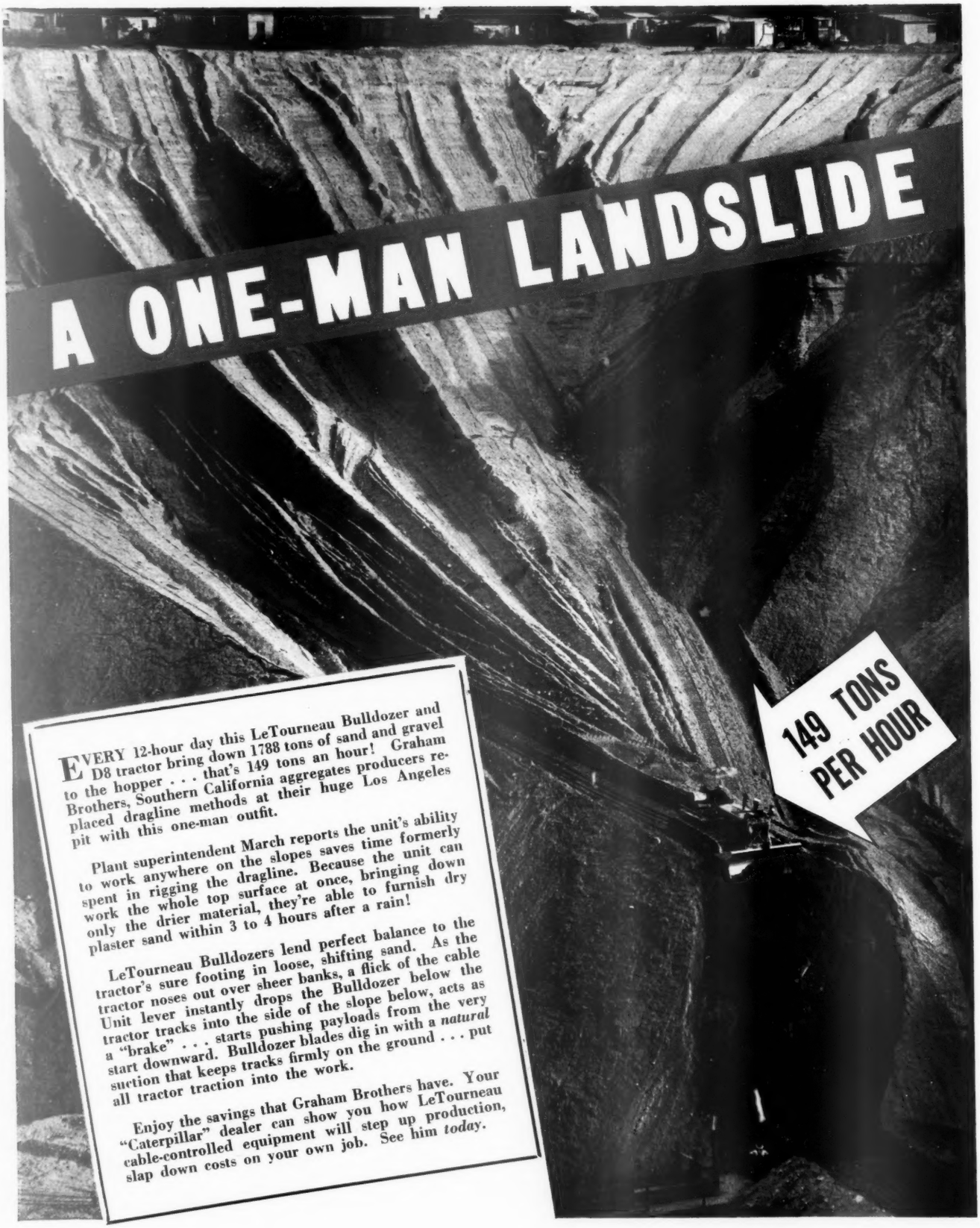


AND THE PIT

NORTHWEST



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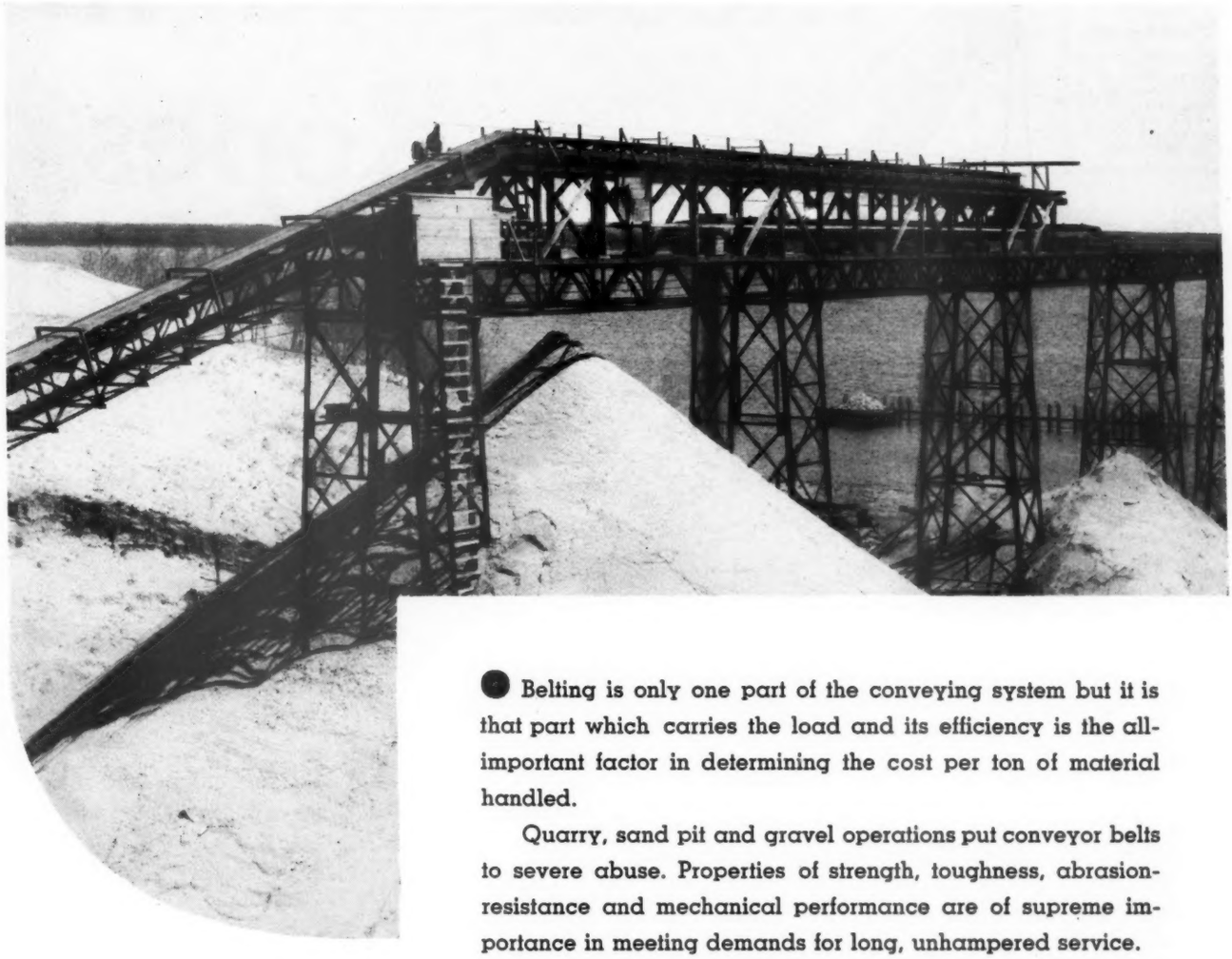

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V-SR2

"Flex-Set" Preformed Yellow Strand Wire Rope

PIT AND QUARRY

Vol. 31 July, 1938 No. 1

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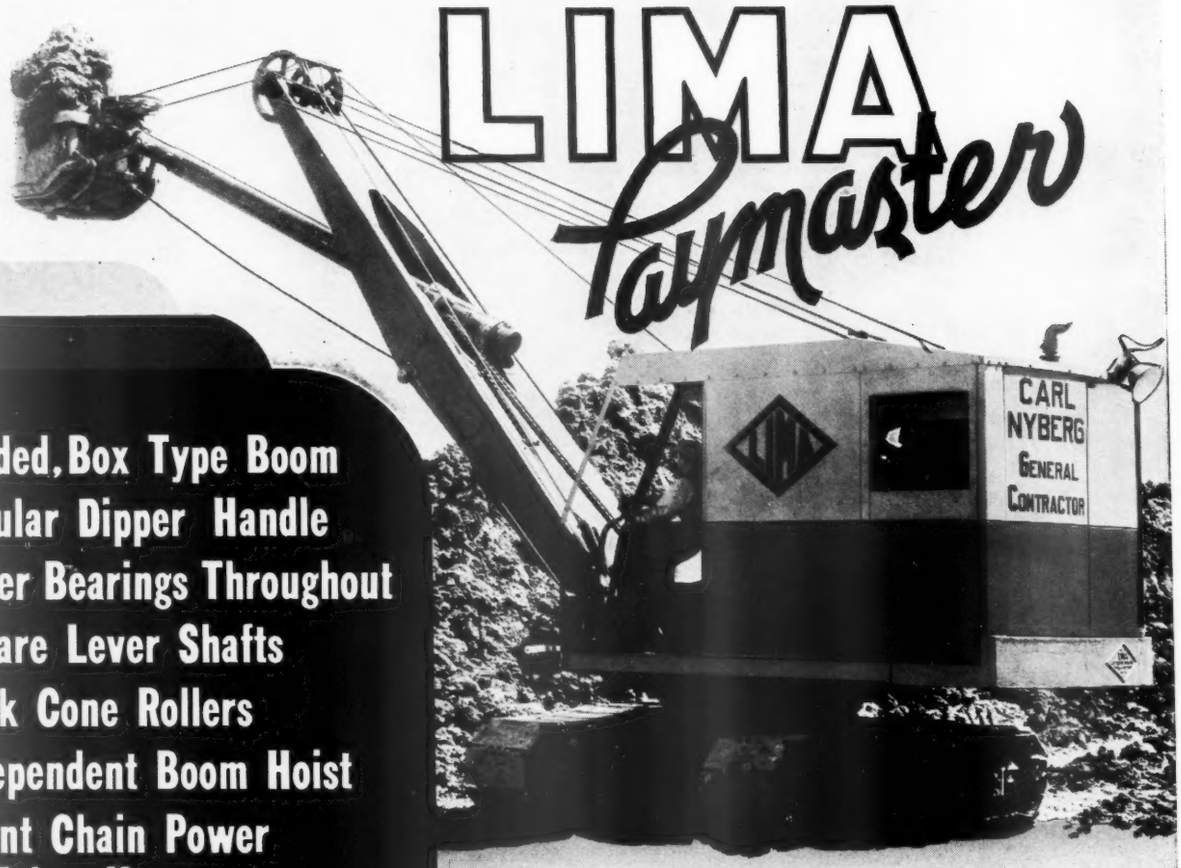

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PIT AND QUARRY

CHICAGO JULY, 1938

Cincinnati Again to Be Convention City

N. C. S. A. DIRECTORS GATHER

Twenty directors of the National Crushed Stone Assn. gathered at the French Lick Springs Hotel, French Lick, Ind., on June 16 for their mid-year meeting. The time and place of the 1939 convention were decided upon. It will be held in the Netherland Plaza Hotel, Cincinnati, on January 30, 31 and February 1 of next year.

Instead of presenting his usual mid-year report on the activities of the association, Engineering Director A. T. Goldbeck showed a number of stereopticon pictures and gave a brief talk on various problems of a technical nature which have been studied by the association's technical staff.

J. R. Boyd, the association's administrative director, reported on the legislative activities of the Federal government and pointed out some of the problems which crushed-stone producers will face as a result of laws recently enacted.

The control of the dust problem in the state of New York was discussed by Otho M. Graves, president of the General Crushed Stone Co., Easton, Pa. He said that the Industrial Hygiene Division of the New York State Department of Labor had asked that the association suggest some person who could sit on its advisory board to represent the interests of the crushed-stone industry.

A. J. Krause, president of the Columbia Quarry Co., St. Louis, made some remarks on the subject of government competition with crushed-stone plants through the W.P.A. J. A. Rigg, general manager of the Acme Limestone Co., Alderson, W. Va., stated that the Washington office of the W.P.A. is definitely opposed to the government competing with the crushed-stone industry, and that where such competition exists it is due to a misunderstanding of Federal rules and regulations on the part of local administrators and that cases of such competition will be corrected at once if proper complaints are made.

Russell Rarey, vice-president of the Marble Cliff Quarries Co., Columbus, O., then commented on the government's policy in administering Sec. 7 of the 1938 Agricultural Conservation Program Bulletin.

All those who attended the meeting were invited to see three motion pictures, two of which dealt with the contributions that industry and technologists are making to the advancement of American living standards, while the third was the motion picture recently released by the U. S. Department of Labor to illustrate the ravages of silicosis.

National Gypsum Co. to Erect Board Plant

The National Gypsum Co., Buffalo, N. Y., is making plans for construction of a new $900,000 plant "probably at Savannah, Ga.," Melvin H. Baker, president, has announced. The plant will manufacture gypsum plasters, boards and other products. Its exact location will be announced later, Mr. Baker said. The new plant will use gypsum rock brought from the company's quarries in Nova Scotia and will serve the South.

Announcement of the plant followed the company's registration with the S. E. C. in Washington of a $3,500,000 issue of sinking fund debentures to be due May 1, 1950, part of the proceeds from which will be used for the new plant.

A new insulation-board plant has just been completed by the company at Mobile, Ala.

The Mikolite Co., Kansas City, Kan., maker of insulating plaster, has been taken over by the Lehigh Portland Cement Co., Allentown, Pa., and will operate as a subsidiary.

R. W. Rice, head of the company, will serve as general manager of the Mikolite division for the Lehigh company.

H. O. Cole, 52, Dies at Cape Girardeau

WAS MARQUETTE PLANT HEAD

Harry O. Cole, 52, for the last 13 years manager of the Cape Girardeau, Mo., plant of the Marquette Cement Mfg. Co., died Sunday, May 29, of a cerebral hemmorhage. He had been in rather poor health for two years, but had been active in the management of the Cape Girardeau plant except for short vacation periods in Florida.

Mr. Cole was born in Ashtabula, O., and his first connection with the cement company he served for 31 years came in 1907 when he became shipping clerk at the LaSalle, Ill., plant. He remained at LaSalle in various capacities until 1924, when he went to Cape Girardeau as office manager and in 1925 succeeded C. H. Sonntag, who had been superintendent.

Burial took place June 1 in Memorial Park Cemetery at Cape Girardeau. Pallbearers, members of the plant staff, were: E. B. Stone, office manager; James Howe, construction foreman; Ben Griffaw, mill foreman; Guy B. Matthews, chief chemist; Wm. Barks, shipping clerk; M. P. Greer, safety engineer; Capt. John Luchow, master of the towboat *Wm. Dickinson,* and E. M. Gould, quarry superintendent.

$12,000,000 W.P.A. Material Purchase

The Works Progress Administration has asked bids on an estimated $12,000,000 worth of cement, asphalt, sand, gravel, and crushed stone—one of the largest material and equipment purchases ever made by the W.P.A.

Bids were scheduled to be opened June 29. Delivery will be required during the next six months.

Ready-Mix Directors Meet at Pittsburgh

1939 CONVENTION DISCUSSED

The annual summer meeting of the board of directors of the National Ready Mixed Concrete Assn. was held on June 3, 1938, at the William Penn Hotel, Pittsburgh, Pa. In attendance were the following members: James F. McCracken, president; A. J. O'Connor, secretary; Stephen Stepanian, treasurer; Alexander Foster, Jr.; and H. F. Thomson. Also present were V. P. Ahearn, executive secretary; Stanton Walker, director of engineering; Lion Gardiner, B. F. Devine, N. C. Rockwood *(Rock Products)* and W. E. Trauffer *(Pit and Quarry)*. The board decided that the Ninth Annual Convention of the Association be held on January 25, 26 and 27, 1939, at the Netherland Plaza Hotel, Cincinnati, O., coincident with the meeting of the National Sand & Gravel Assn.

The mid-year report of association finances was read and approved, as was also the proposed budget for the fiscal year ending July 1, 1939. Methods for securing new members were also discussed and it was agreed that the most effective method would be to obtain the co-operation of the present members.

There was also discussion of the type of program to be presented at the annual meeting and it was agreed that informal meetings devoted to specific problems of the industry were the most helpful. Formal presentations by competent speakers will be devoted to the general problems of the industry. It was also agreed that a questionnaire be sent out prior to the convention to ascertain business conditions, and that summarized results of the survey be presented at the forum on business conditions.

The engineering department was instructed to carry on certain investigations already started and to arrange for a joint meeting of the various association committees to develop recommendations for the future policy of the association in the preparation of standards.

The board was entertained at luncheon by the Ready Mixed Concrete Assn. of metropolitan Pittsburgh. Members of this association and other producers from this area attended the afternoon meeting.

V. P. Ahearn, executive secretary, in the afternoon reported on labor relations in the industry and reviewed the activities of the association in this regard. He also reported on the developments growing out of the new cement purchasing policy of the Federal government. Members of the board commended the staff on its work in keeping members informed on this matter and requested that this work be continued.

Following a general discussion of recent Federal legislation Stanton Walker, director of engineering, presented a brief summary of the status of ready mixed concrete specifications and also discussed the standardization work of the association.

Chemical Lime Co. Trusteeship Is Extended Ninety Days by Court

On June 13, at a hearing in Harrisburg, Pa., the trusteeship of R. Spencer Townsend and Clarence P. Wynne, both of Scranton, for the Chemical Lime Co. of Bellefonte, Pa., was continued for ninety days. This additional time was granted by the court in order to give the trustees an opportunity to develop fully a definite plan of operation for the defunct concern, which is now proceeding under the 77B clause of the bankruptcy law.

The history of this organization has been punctuated with difficulties from its beginnings. Originally the Centre County Lime Co., controlled by the Walker family, operated on the Bellefonte Ledge with four natural-draft vertical kilns from which a fine quality of lime was produced. The demand for the product was great and the little company prospered to such an extent that the Chemical Lime Co., which owned ten upright kilns and a fair size stone-crushing plant, suggested that the owners of the Centre County plant assume the management of its property. This latter group owned only 1,200 ft. on the Bellefonte Ledge and, with such a limited deposit was confronted with early kiln-stone exhaustion. The Chemical Lime Co., which was owned by a group of prominent Centre County families, felt that with the prosperity that had attended the Centre County company, it would, under that management, retrieve its losses. In this its owners were mistaken, and in the later 1920's it was necessary to interest outside capital. Alexander Brown & Sons, bankers of Baltimore, saw sufficient possibilities in these two properties to merit the investment of nearly one-half million dollars. The new board of directors was imposing and, on the strength of its members' connections, the capacity of the stone-crushing equipment was increased, a washing plant added, and hydrating equipment, complete with storage silos, etc., was constructed on the chemical property, which then became No. 1 plant, and a fine stone plant with a rotary drier, two additional kilns, and a new steel kiln-charging trestle were installed on the Centre County property, which later was to be known as No. 2 plant.

At this time H. D. Brigstock took over the local management in the capacity of vice-president. Sales increased to such an extent that reciprocal agreements had to be made with other lime shippers in the vicinity to take care of the demand. However, the depression found the new organization insufficiently strong to carry on. Furthermore, the exhaustion of accessible stone deposits and internal strife added to the difficulties.

About the first of the year 1936 Mr. Brigstock resigned to accept the vice-presidency of the Thomasville Stone & Lime Co. at Thomasville, Pa., and the Chemical Lime Co. was reorganized under an R. F. C. loan of $500,000. In addition to this equipment manufacturers and others took $75,000 in stand-by agreements, complete payment to be withheld until the R. F. C. loan had been fully satisfied. By this time Alexander Brown & Sons' equity had shrunk to a $75,000 second mortgage. Willard Case, formerly associated with the Reconstruction Finance Corporation, became president of the new organization. Robert F. Walker of the original organization continued under the new order as vice-president in charge of sales. W. R. Cliffe, for many years general superintendent for the American Lime & Stone Co., assumed the responsibilities of vice-president in charge of operations and engineering, but work was scarcely started on the new mine and rotary kiln plant, located to the west of the No. 2 or Centre company plant, when he resigned to join H. E. Millard in the construction of the new rotary-kiln lime plant at Annville, Pa.

Before the close of 1936 it became apparent that additional funds would be required to carry on the new project, so again the Reconstruction Finance Corporation came to the rescue with an additional $220,000. By the closing months of 1937 this sum of money had been spent and the new property was still far from completed, so that it became necessary for the judge of the Centre County courts to appoint receivers. W. J. Emerick and Frank Crawford, both of Bellefonte, served in this capacity for several weeks until the United States Court decided to protect

the assets of the company by inaugurating 77B proceedings. At this point Mr. Case resigned and left for Florida and Mr. Walker, long identified with the lime interests in the East, assumed direction of the construction of an electric kiln for the production of lime and dry ice in Los Angeles.

H. D. Brigstock, because of his thorough knowledge of that situation, was recalled from his vacation in Florida to head the trustees. However, after serving in that capacity for approximately a month, pressure of his other responsibilities made it necessary for him to resign. Messrs. Wynne and Townsend have continued as trustees since.

Silicosis Verdict in Cement Firm's Favor

After a trial which lasted seven days, a jury in common-pleas court at Cape Girardeau, Mo., returned a verdict in favor of the defendant, the Marquette Cement Mfg. Co. in a suit in which B. W. Snider, former employee, had asked judgement in the amount of $20,000 for the alleged contraction of silicosis while so employed.

The jury, in denying damages, was out only an hour.

Honolulu Ready-Mixed Firm Growing Rapidly

Ready-mixed concrete is popular in Hawaii, according to the record of growth of the Ready Mixed Concrete Co., Ltd., of Honolulu.

The company, originally the Clarke Transportation Co., established its first batching plant in 1936 and erected its second last year. Four 2½-cu. yd. mixer trucks were used when operations started in January, 1936. A few months later, four more were purchased. In 1937, another lot of four was delivered and early in 1938, four more were purchased and placed in service, making 16 in all. The company's largest job was to supply 24,000 cu. yd. at Hickam Airport.

J. J. Makin is president and general manager of the company. His engineer and assistant is Louis P. Price.

Monolith Entertains 50 at Dinner Party

More than 50 engineers and contractors were entertained at a dinner in Bakersfield, Cal., recently by the management of the Monolith Portland Cement Co.

A feature of the gathering was the showing of a motion picture entitled "A Day at Monolith," which depicts the manufacture of cement at the Monolith plant from drilling in the deposit to loading the sacked product for shipment.

Canadian Gypsum Co. Installs Wool Plant

Canadian Gypsum Co., Ltd., has started extensive repairs and alterations at the recently-acquired plant at Weston, Ont., formerly occupied by the Eoman Stove Co. Furnaces, cupolas and other machinery are being installed to make mineral wool. Operations will begin in July.

Considerable new equipment has been installed by the East Lansing Gravel Co., East Lansing, Mich., at its Holt Road plant. Dry excavation is now being employed, the plant having formerly been a dredging operation.

Directors and guests of the National Sand & Gravel Assn. at the summer meeting at Dallas, Texas

Legislation Engages Interest at Dallas

GRAVEL ASSN. DIRECTORS MEET

The new wages and hours law engaged much of the attention of the directors of the National Sand & Gravel Assn., who met in Dallas, Tex., during the week of June 20. Nineteen directors attended. The place and dates of the 1939 convention were chosen as the Netherland Plaza Hotel in Cincinnati and January 25 to 27 respectively.

At the first session Director of Engineering Stanton Walker reported on the association's research activities. He said that the association's work on soundness tests is being continued. The problem of stripping of aggregates in bituminized surfaces was discussed. Stability, according to Mr. Walker, seems to depend more on surface texture than on the angularity of the aggregate particles.

Federal legislation and labor relations occupied the second session. V. P. Ahearn, executive secretary, discussed the legislation situation thoroughly. In connection with the wages and hours law there was considerable doubt as to its applicability to the sand-and-gravel industry. It is not known, for example, whether the determination of whether or not the industry is engaged in interstate commerce within the meaning of the act will be determined individually by separate producers or collectively for the industry as a whole, and whether, in the latter event, all producers in the industry will be designated as engaged in interstate commerce.

At the third session action was taken on the question of where and when the 1939 convention should be held, with the result already mentioned.

The following directors and visitors were present: J. Rutledge Hill (president); V. P. Ahearn (executive secretary); Stanton Walker (director of engineering); H. S. Davison (secretary-treasurer); J. F. Berger and Bradley Carr (manufacturers' division); Anderson Dana, Alexander Foster, Jr., Francois Gautier, Philip Gemmer, P. W. Gifford, Harold Lacy, Howard Parks, Robert J. Potts, John Prince, W. N. Rogers, John M. Settle, Harry Stewart, Russell Thorstenberg, S. A. Phillips (PIT AND QUARRY), and N. C. Rockwood (*Rock Products*).

According to a tabulation of purchases of materials by American railroads in 1937 made by *Railway Age*, $28,272,450 was spent for ballast and $1,959,895 for cement. This compares with $16,650,112 for ballast and $1,313,576 for cement in 1936.

Open Indianapolis Lime-Putty Plant

OWNED BY AGGREGATES FIRM

Numerous architects, contractors and government officials in Indiana and Kentucky were present June 15 at the plant of the State Sand & Gravel Co. in Indianapolis to witness the operation of the company's new lime-putty plant which has just been erected to serve the Indianapolis territory. The plant is a standard Brooks-Taylor two-tank unit, fabricated by the Chicago Bridge and Iron Works. It is designed for straight-line operation, the trucks being driven from beneath the lime-putty tanks to the sand-batching hopper before transportation of the material to the job. Space has been left between the two tanks and the sand batcher for the installation of two additional tanks to provide greater capacity as the demand for the material increases. The addition of a third tank doubles the capacity. In this plant lime-putty is withdrawn from one tank while the other is being used for aging. The lime-putty which remains in each tank for seven days before withdrawal for use.

James W. Hurt is president of the State Sand & Gravel Co., and W. L. Heston is the manager of the plant. The company recently took over the ready-mixed concrete business of the Allied Concrete Processing Co., Inc., and the business will be conducted under the name of the Heston Certified Concrete Co., 1245 W. Washington St., Indianapolis.

W. Hayden Brooks, designer of the Brooks-Taylor lime-putty plants, and patentee of the process, was present to explain the process to visitors. This plant is the twelfth Brooks-Taylor lime-putty plant to be erected in the United States.

Material to keep the Pounding Mill, Va., crushed-stone plant of W. W. Boxley & Co. supplied for a year was released in a blast at the quarry recently when about 150,000 tons were brought down. Twenty-eight holes, ranging from 75 to 220 ft. deep, were loaded with 70,000 lb. of explosives for the blast.

The new lime-putty plant at Indianapolis.

At the dedication of the lime-putty plant were, left to right, S. A. Phillips (Pit and Quarry), Hayden Brooks (Brooks-Taylor Co.), M. E. Smith (Chicago Bridge & Iron Wks.), and Hubert Rodman (Marblehead Lime Co.).

WEST COAST NEWS

PLANS NEW CEMENT MILL

Henry Kaiser, Inc., of Oakland, Cal., has obtained control of the vast limestone deposits near Santa Clara, Cal., formerly held by the Santa Clara Holding Co. Mr. Kaiser, prominent aggregates and concrete producer, has a staff of engineers at present engaged in preparing plans for a wet-process cement plant of 2,500 bbl. daily capacity, with provisions for doubling this capacity in the future. The deposit is being analyzed and studied with extreme care to allow the use of the latest methods of raw-material control.

LEASES LIME PLANT

Walter Wechlo, formerly superintendent of the Holmes Lime & Cement Co., has leased the lime plant from that concern at Felton, Cal., and will operate it as the Felton Lime Co.

LIMESTONE DEVELOPMENT

Raymond J. Schirm, general manager of the Basic Limestone Products Co., San Francisco, is developing his personal holdings by erecting a limestone-crushing plant with a daily capacity of 100 tons at Lyndon Switch, near Los Gatos, Cal.

REBUILDS FLOODED PLANT

The Carmel Valley stone plant of M. J. Murphy, Inc., Carmel, Cal., was washed away during the floods in California several weeks ago and work is going forward on the construction of an entirely new plant with new equipment.

Lehigh to Continue Rebuilding Program

TWO PLANTS ARE AFFECTED

After serious consideration of the several problems presented and, despite the gloomy outlook for the immediate future of the business, the Lehigh Portland Cement Co. has decided to continue the program of rehabilitation inaugurated in 1934 and will promptly proceed with the complete modernization of its Union Bridge, Md., and Alsen, N. Y., plants.

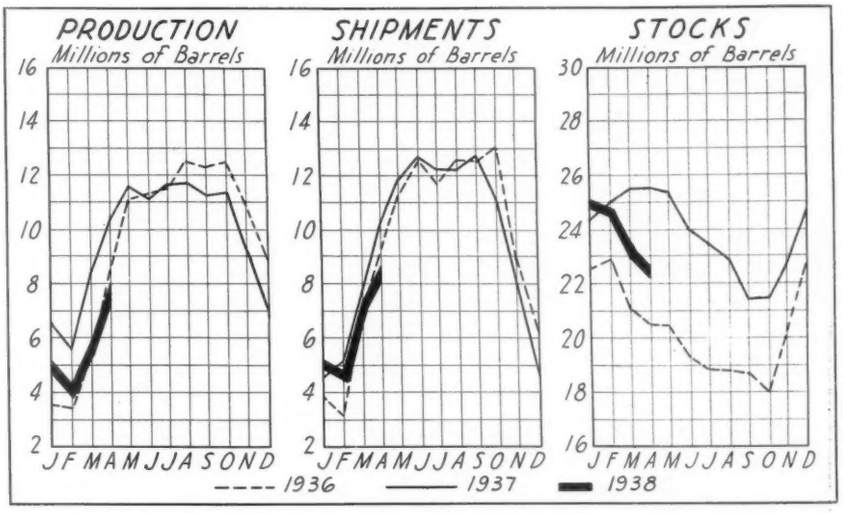
It may be recalled that during the recent depression the company abandoned three of its plants in the Lehigh District and wrote off the net assets of these plants against surplus. Although all the obsolete machinery and equipment at these plants was sold for scrap, all the units of recently purchased machinery and equipment have been preserved for future use. Although the art of cement manufacture is constantly improving, many of these units are as modern and as efficient to-day as they were six or eight years ago. Wherever any of these units can be utilized in the lay-out of the improved plants they will be substituted for machinery that would otherwise have to be purchased on the market.

The Union Bridge plant was formerly the property of the Tidewater Portland Cement Co., the assets of which were purchased at the receiver's sale in 1925. Although this mill has been operated more or less continuously by Lehigh ever since, only such improvements as were absolutely essential to the operation of the plant were made. It is now planned to modernize the plant completely and raise its efficiency to a parity with other Lehigh mills.

The Alsen plant, formerly owned and operated by the Hudson Valley Portland Cement Co., was also acquired at a receiver's sale in 1925 but, because of the rapidly declining demand in the northeast, was operated by Lehigh for only three years after the date of its purchase. The present building, docks, and storage facilities are still in good condition and will be utilized to whatever extent is possible in the lay-out of the modernized plant. Certain units of machinery and equipment which were installed shortly after Lehigh bought the property will form the nucleus around which the new plant will be built. The plant is designed for the dry process and power will be generated from waste heat.

The rehabilitation of both plants will proceed simultaneously. Since many departments must be entirely reëquipped at Alsen, it is not likely that the rejuvenated plant can be put in operation much before the close of 1939. The work at Union Bridge will be synchronized with operating schedules so that there may be no interruption of production or shipments. The major installations of additional machinery and equipment will be done during the usual winter shutdown and present plans indicate that the mill when modernized will resume operations in the spring of 1939.

Because surplus machinery and equipment now on hand can be readily utilized and because no new buildings will be required, it is contemplated that the work can be done at a new low figure for cement-mill reconstruction.



The Portland-cement industry in April, 1938 produced 7,983,000 bbl., shipped 8,678,000 bbl. from the mills, and had in stock at the end of the month 22,283,000 bbl., according to the Bureau of Mines. Production and shipments in April, 1938 showed decreases, respectively, of 23.3 and 15.5 per cent. as compared with April, 1937. Stocks at mills were 13.5 per cent. lower than a year ago. The output of the new Gulf plant at Houston, Tex., which began producing and shipping finished cement during the month, is included. The totals were compiled from reports for April received by the Bureau of Mines, from all manufacturing plants. The mill value of the shipments—16,224,000 bbl.—in the first quarter of 1938, is estimated as $24,059,000.

Coming Events

August 29-September 3, 1938, Grand Rapids, Mich.—Power Show and Mechanical Exposition, National Association of Power Engineers, Civic Auditorium.

September 30-October 1, 1938, Urbana, Ill.—Sixth Annual Illinois Minerals Conference, University of Illinois.

October 10-14, 1938, Chicago, Ill.—National Safety Congress and Exposition, Stevens Hotel.

Recent Equipment Installations

A new rotary kiln is being installed in the Chubbuck, Cal., plant of the Chubbuck Lime Co. of Los Angeles. * * * *Two Lima gasoline shovels have gone into service at the operations of the Laura Gravel & Stone Co., Phillipsburg, O.* * * * New equipment at the crushed-stone plant of the Eastside Building Materials Co., Beverly Hills, Cal., includes a Kennedy-Van Saun crusher.

Smith Engineering Works, Milwaukee, Wis., designed and supplied much of the machinery for the new Tuskegee Sand & Gravel Co. plant at Tuskegee, Ala.; other equipment includes a Robins conveyor and a Northwest dragline. * * * *A 10-in. by 36-in. Wheeling jaw crusher has been installed by the Montalvo Rock Co., of Ventura, Cal.*

Cedar Rapids jaw- and roll-crushers were placed in operation recently at the sand-and-gravel plant operated by Blair & Leroy at Franklin, O. * * * *The Azusa Rock & Sand Co., Azusa, Cal., has placed 18 Ford V-8 trucks in service for delivering materials.* * * * A Traylor gyratory crusher has been installed by Triangle Certified Concrete, Inc., at San Bernardino, Cal.

Grinding, Separating Machinery Installed

According to William Fowden, manager of the South Dakota state cement plant located at Rapid City, the plant is undergoing numerous improvements at the present time.

Included in the equipment being installed are a Bradley Hercules mill and a Sturtevant separator.

EDITORIAL

Misinformation in the Press

SEVERAL times in recent years we have had reasons for commenting on various aspects of the "liberty of the press" theme. When discussing freedom of speech or of the press we have attempted to point out the great difference between the attitudes of those speakers, writers and publishers who sincerely argue for the right to express their opinions without restraint and those who, under the cover of the same reasonable claim, really seek the right to make any statement which it may please them to utter, irrespective of its truth or falsity and without regard to its effects on public well-being, and to withhold or suppress any facts or opinions that may prove embarrassing or expensive to themselves or to those who support them.

The objectives of the former group are likely to be laudable, for they usually seek merely the right to instruct and inform, to point out error or what they conceive to be error, and to work for ends that they believe to be in the public interest. The latter group commonly discloses no genuine interest in public well-being, even though it may practice an elaborate form of make-believe in an attempt to create the illusion that it does have such an interest, and is much more concerned about possible encroachments upon its exercise of the arts of dissimulation and misrepresentation than about any genuine principle of liberty of expression. Whereas the one group acknowledges and accepts as a fundamental requirement in the exercise of the right of free speaking and writing the duty not to abuse it, the other does neither the one nor the other, but utilizes every existing privilege to further its own ends and to defeat those of its opponents, with little or no regard to the ethical principles of veracity, integrity, tolerance or good sportsmanship. Among members of the latter group the only legal restraint on the tendency to abuse the right of free expression is the fear of punishment through prosecution for libel, slander, sedition, obscenity, and the like. Taken alone, this is a rather weak deterrent, since suits for such offenses are not numerous nor often successful and seldom operate as effective checks on the activities of those who have either no or very low standards of ethical conduct.

Senator Minton lately aroused the ire of certain members of the press when he introduced for legislative enactment a bill designed to prohibit the publication of statements known to be untrue. Despite the fact that no sincere advocate of the freedom of the press would likely object to the enforcement of such a law, since it seeks to attain a state of honesty in publication that most reasonable, liberty-loving men would consider highly desirable, many newspapers were loud in their opposition to the Minton proposal, alleging—and without sound reasons, we believe—that it represented an effort at dictatorship over the expression of opinions and, if enacted, would make the newspapers of the country subservient to the federal government. These high-sounding denunciations of the Minton bill, calculated to appeal to those who display their appreciation of their liberties more through outward pretense than through practice and observance, sprang from no innate passion for freedom in its genuine sense but from an unwillingness to relinquish any of the gradually-accumulated store of those ingenious tricks for lying without being libelous, for ridiculing without being defamatory, for reporting falsely without being slanderous, which have been so highly developed by members of the journalistic profession. So many large modern newspapers habitually utilize this skilfully-refined technique that some of their more charitable critics have expressed the belief that it is an inevitable part of newspaper publishing, a practice that has arisen from the very forces that make the modern newspaper a successful enterprise. While they like to think of the press as a public servant, unselfishly devoting its talents and resources to the betterment of general understanding and to the spread of factual information, their knowledge of conditions forces some of them to the belief that the driving force of ambitious self-interest makes it virtually impossible for newspapers to be accurate, honest or fair.

THE integrity of our newspapers has more than once become a question of more than academic interest to members of our own industries, and a fresh example of false reporting has recently been provided by the *Chicago Tribune,* ardent opponent, as one would expect, of the Minton bill. In a feature article entitled "Huge Swarm of Lobbyists Feed on Easy Money," written by Walter Trohan, a member of its Washington staff, for its issue of May 18, the opening paragraph says:

"A swarm of lobbyists has descended upon Washington to plague Congress and the administration for shares of the 5 billion dollar pump-priming funds. In their anxiety to get a share of the latest tide of easy money, various communities, industries, professions, and material producers have engaged lobbyists to press their claims."

The article includes a list of "groups which are directly or indirectly interested in the division of funds and projects in the pump-priming program," among whom are mentioned the National Crushed Stone Association, the National Industrial Sand Association, the National Ready Mixed Concrete Association, the National Sand & Gravel Association, and the Portland Cement Association. As we said in a letter of protest to the editor of the *Chicago Tribune,* "the implication is that these trade associations were organized to lobby for government favors under the new proposed federal 'pump-priming' program," whereas "only one of these associations, the second mentioned, is less than 8 years old, and three of the remaining four are more than 20 years old" and "no one of these associations was created for lobbying purposes." Only the members of these associations know how false is the impression created in the minds of the *Tribune's* readers by this writer's baseless statements. That they are without foundation is demonstrated not only by the facts but even more convincingly by the author's verbal admissions to the secretary of one of the associations who, similarly astounded by the glaring falsity of the article, protested against its injustice. The writer admitted frankly that he "did not have a single fact upon which to base the story," that he had obtained a list of construction-industry associations from "somebody at the capitol" and that the story was written on his own assumption that these organizations were "probably" lobbying for the relief bill. We share the views of the protesting secretary when he adds that "this is a sad commentary on the quality of reporting coming out of Washington," and that "it makes one wonder if there is any truth whatever in the *Tribune* and other papers."

SHOCKING as Mr. Trohan's article and admissions may be, the false implications it contained apparently raised no doubts, either of accuracy or of public policy, in the editorial offices of the *Tribune.* It was seemingly sufficient that the article added new "evidence" to the already huge mass of "facts" that had previously been adduced in proof of the economic fallacy and special selfish interests that allegedly underlie the government's program for economic rehabilitation. Whether the so-called "pump-priming" plan is sound or fallacious is not the point at issue. The *Tribune's* editorial policy, for reasons known best to the *Tribune's* publisher, is opposed to the present government in Washington and *ipso facto* to everything it does or proposes. Any article which supports or even seems to support that policy need not, apparently, be subjected to critical examination before being accepted as suitable for publication. The passage of Senator Minton's bill would make the publication of such unfounded calumnies a much greater hazard than it is under the "liberal" interpretation of the right of "freedom of the press."

When the framers of the Constitution provided in Article I that "Congress shall make no law . . . abridging the freedom of speech, or of the press," they probably had no intention of freeing all speakers and writers from the restraining influence of a common sense of veracity and honesty. A quarter century before they prepared that document Blackstone had defined liberty of the press as "in laying no *previous* restraints upon publications, and not in freedom from censure for criminal matter when published. Every freeman has an undoubted right to lay what sentiments he pleases before the public; . . . but if he publishes what is improper, mischievous, or illegal, he must take the consequence of his own temerity." This was somewhat differently expressed by Henry Sidgwick, when he wrote in his *Elements of Politics:* "It is an important practical security for freedom of political utterance that a man shall not be prevented from writing and publishing what he likes, by any interference, before the act, of an executive official,—but only restrained by the dread of punishment judicially inflicted after publication. . . . But it does not follow that there should be no special press law: and it would be inexpedient that such a law should be constitutionally prohibited: since the power and the inducements that an unscrupulous editor of a newspaper has to disseminate calumnies about public officials—or even private persons in any way important—constitutes a grave danger, against which it is desirable to take special precautions." The danger, Sidgwick might have added, threatens not only individuals but institutions, political, social, and (as in the case just cited) industrial.

FOR some it may be difficult to understand how newspapers supported by the earnings of business and usually, for that reason, championing the cause of business in controversies between government and industry, can be guilty of misrepresenting the aims of business organizations, such as the trade associations affected by Mr. Trohan's article. The answer in this case may possibly be found in the fact that the members of these organizations are not producers of consumer goods and so are generally not daily-newspaper advertisers whose interests and views must be considerately dealt with.

There is little comfort in admitting the truth of Ostrogorsky's remark that "the newspapers do not wield much influence over intelligent readers." Unintelligent readers are still in the majority and it is for their benefit, as well as for that of the intelligent minority—which in spite of its intelligence is almost as often and as badly misled by newspaper comment and reporting—that some checks should be placed on the growing abuses of the freedom of the press.

Crushing plant with scraper dumping a load over the grizzly.

Wagon Scraper and Tractor Do Double Duty at This Pit

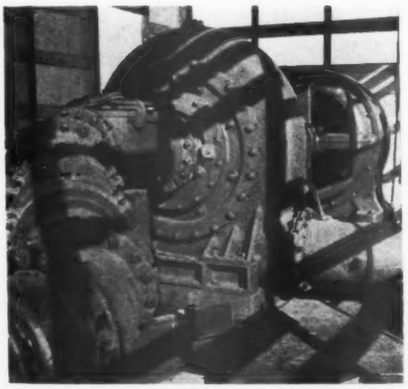
THE Central Construction Co. recently installed a 4-cu. yd. Continental wagon scraper in its gravel pit at Waubay, S. D.

With 5 men, a Pioneer No. 11 portable crushing plant with an 8-in. by 36-in. Cedar Rapids jaw crusher and a roll-crusher, all driven by a Waukesha engine and the scraper drawn by an Allis-Chalmers tractor it is producing approximately 800-cu. yd. of sized gravel and sand per day. The scraper was used for stripping the overburden as well as for building an approach to the dump-box grizzly, before it was put in service in the pit digging gravel for the portable plant. The scraper digs, loads and hauls the material to the dump box, from which a belt-conveyor carries it to the crusher. The portable plant has a capacity of from 75 to 100 cu. yd. per hr. The present haul from the pit to the grizzly is approximately 350 ft. for the round trip. The dump box is kept full all the time, even though the tractor is never used at a higher speed than second, the speed and flexibility of the operation being such that it is not necessary to crowd the digging unit. Even when the gravel is wet, the scraper gets better than 80-per cent. loads and keeps ahead of the crusher.

The scraper back-dumps into the dump box as a truck, and is on its way to the pit while the digging bucket is being lowered into the digging position. It turns and starts to dig on the trip back. In a matter of seconds it has a full load, the digging blade is drawn up, and it is on its way to the grizzly. The scraper loaded and ready to haul has sufficient clearance so that it does not drag. However, its 11.25 by 20 tires carry the scraper close enough to the ground to provide for fast, easy loading.

Only one tractor is needed to keep the crushing plant busy. Power waste from idling is eliminated because material is always going through the plant. Stripping, dumping, ramp building and making ready for the gravel-plant site are all taken care of by the single scraper without the necessity of using other equipment.

Tractor-drawn scraper digging gravel.



The 15-in. dredge pump.

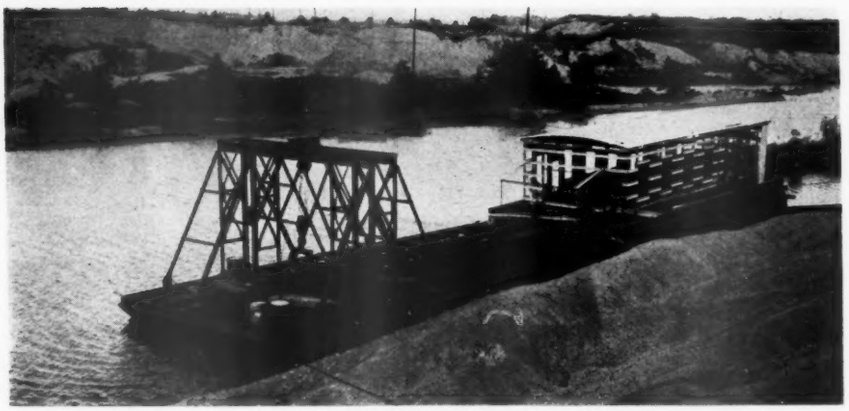
Sturm & Dillard Co. Installs New Dredge at Circleville, O.

UNDER the supervision of its superintendent, J. H. Adams, the Sturm & Dillard Co. has just installed at its Circleville, O., plant a new dredge equipped with a new type of Swintek ladder. The dredge is 136 ft. 2 in. long and 24 ft. 5 in. wide, and was designed by the W. H. K. Bennett Co., Chicago. The ladder is 65 ft. long and is suspended at its outer end from an A-frame whose top is 16 ft. above the 5-ft. I-beam which forms the front cross member. The erecting work was done by the Sturm & Dillard Co. forces.

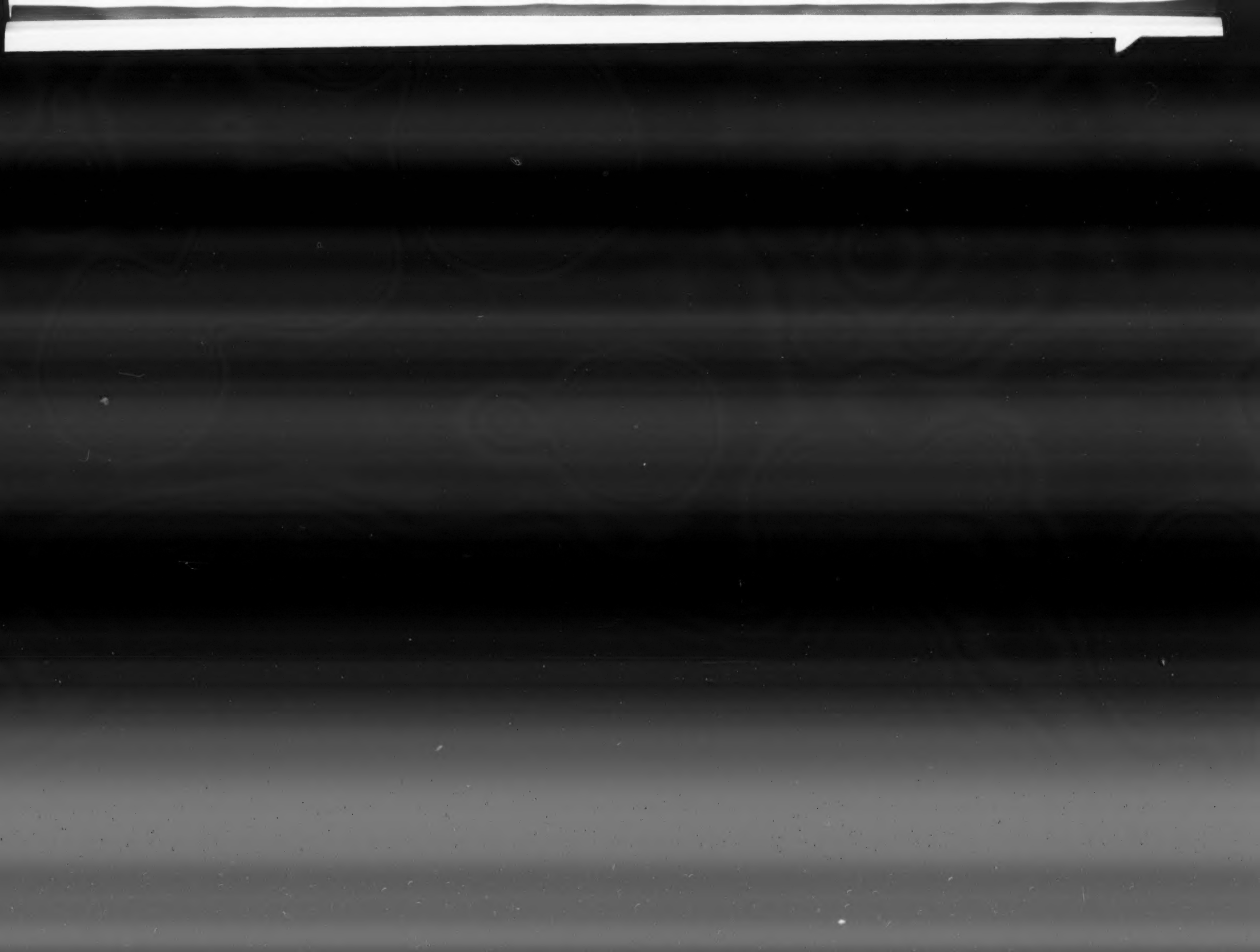
This dredge has an Amsco 15-in. bottom-discharge pump driven by a 600-hp., 2,200-v., 137-amp., 514-r.p.m., 3-phase, 60-cycle Westinghouse motor.

A 30-hp., 440-v., 860-r.p.m. G-E motor drives the cutter chain, which has a speed of 32 ft. per min.; and a 20-hp., 220/440-v., 76-amp., 1,160-r.p.m., 60-cycle G-E motor operates the 5-drum Clyde hoist that operates the ladder.

The dredge is supported on 8 tank pontoons, of which two are under the forward end. The total weight is 325,000 lb., of which 63,000 is accounted for by the Swintek ladder, 22,500 by the pump and 11,500 by its motor. Joseph T. Ryerson & Son furnished the steel for the dredge.



New Sturm & Dillard Co. 136-ft. dredge.

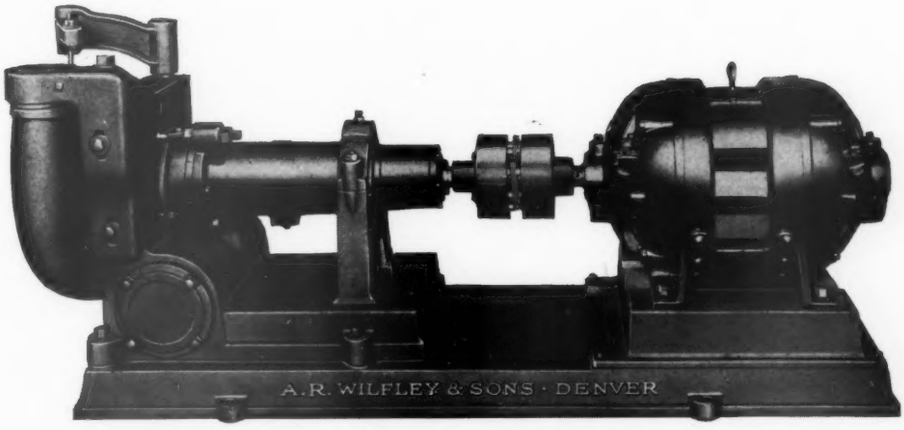


PIT AND QUARRY Special

CEMENT-MILLS SECTION

WILFLEY

centrifugal SAND PUMPS



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AIR SEPARATOR

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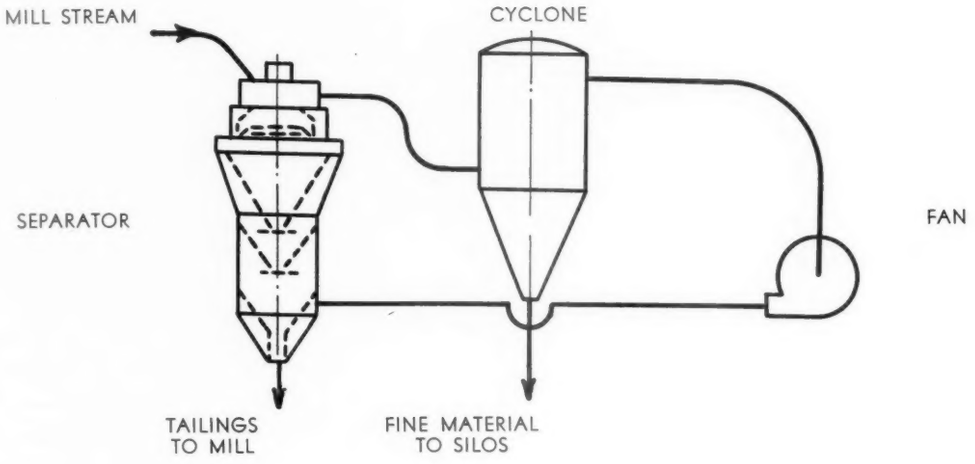

New features of this Separator are: the use of successive separating chambers; a specially designed Cyclone for precipitation of the fines; and an adjustable air current from an independent Fan.

The Separator can be adjusted to deliver any product with surface areas between 1300 and 3000 so that all fineness requirements even of special cements can be fulfilled without the necessity of regrinding the fines.

ADVANTAGES

Installations have shown in- **INCREASED OUTPUT** creases in mill output of from 20 to 40% depending upon the fineness, and still greater increase when grinding to extremely high surface areas.

A substantial increase in **INCREASED FINENESS** fineness results for the same mill output.

FLEXIBLE OPERATION Predetermined finenesses and capacities are readily obtained and maintained by independently adjusting the speed of the Separator and the amount of circulating air.

SAVING IN POWER A substantial saving in power per unit of grinding-mill output is effected.

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By PAUL N. RYLANDER
General Manager, M. A. Long Co.

Puerto Rico's New Cement Plant

THE bubbling of an idea over a period of years has finally broken into realization with the completion of a cement plant in Puerto Rico, constructed by the Federal government and to be identified as the Puerto Rico Cement Corp.

A number of years ago an attempt was made to promote a cement plant. This progressed to the point of erecting a few pieces of equipment on a site located on the road from San Juan leading to the now-completed government plant. Meanwhile the equipment has remained standing and, if of no other value, has served as a reminder to the public of a possible industry that might be added to the growing insular business activities.

Four years ago some private interests recognized the possibilities of a cement plant in Puerto Rico and were quite active in their intentions, but these efforts were ended when the government announced its decision to build a plant.

Several possible sites were considered. The present location at Guaynabo, 7 mi. distant from San Juan, was selected because of its superior raw materials, its close proximity to San Juan, the capital of Puerto Rico with the largest insular shipping facilities, and, finally, its nearness to the center of cement demand.

The increased demand for cement in Puerto Rico in recent years is clearly evident from the active solicitation for

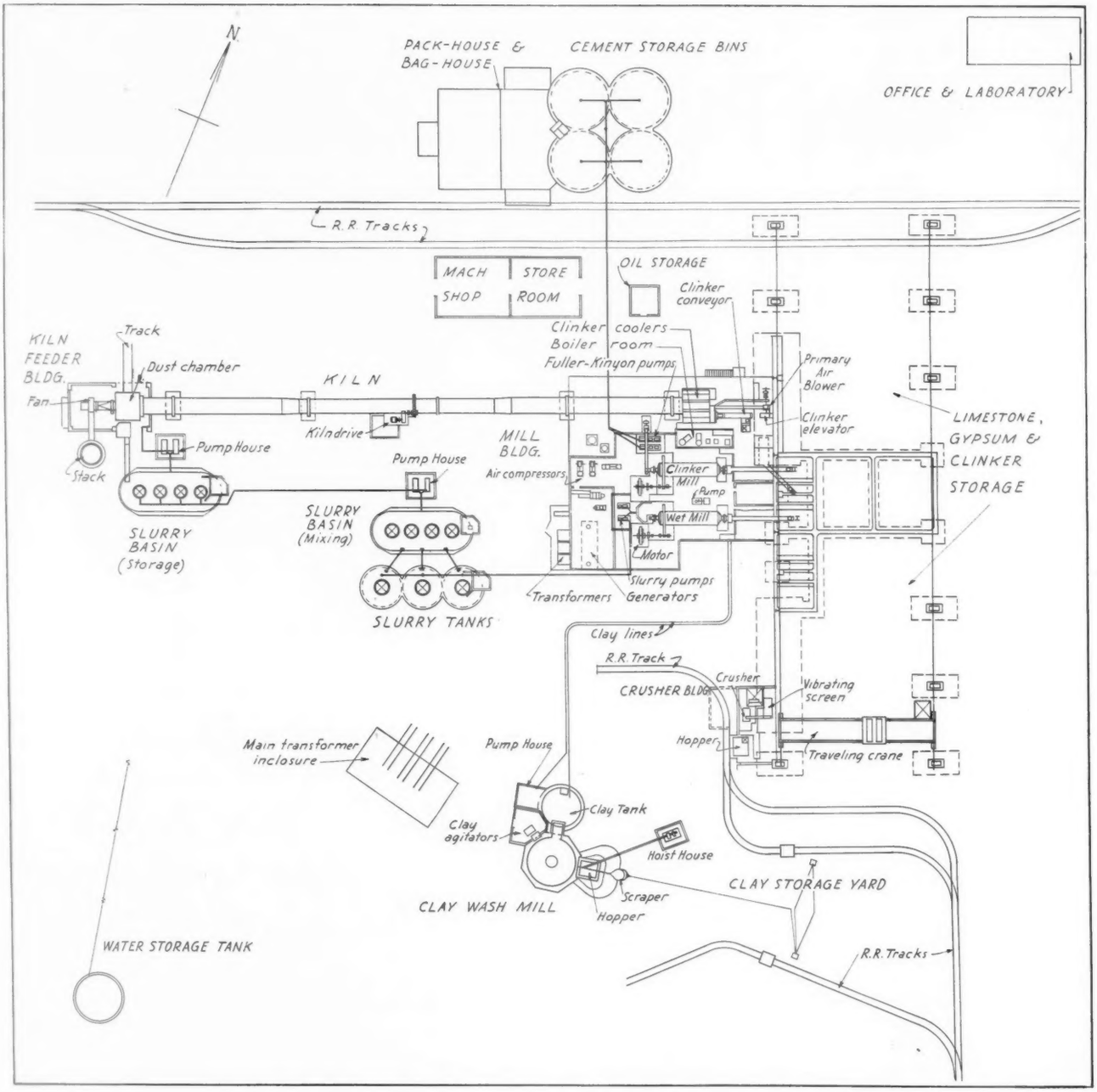
A typical hut of a native worker beneath the Puerto Rican palms.

business by a number of United States cement companies who thought the business of sufficient amount to attract their attention. This increase in demand has been occasioned by an increase in business requiring construction, by government activities and also for the reason that industrial buildings, houses and apartments, of which many are being built in San Juan and in other insular localities, are being constructed of concrete as an insurance of permanency against the frequent hurricanes, which in a period of years have caused serious loss of life and property.

The Federal government acted wisely in its decision to build a cement plant among other projects, since the normal demand of the island, with its increasing activities, can support a plant of the size constructed. All conditions being favorable with the required raw materials, a sufficient demand for cement and a modern plant, there is no reason why the project should not prove a success with efficient handling. The plant was constructed under the direction of the Puerto Rico Reconstruction Administration as a depression relief measure and as one of a number of self-liquidating projects in an effort to create permanent employment, a serious problem for the rapidly-increasing population. The Hon. Harold C. Ickes, Secretary of the Interior, is director, and Miles H. Fairbanks is the Assistant Administrator of the Puerto Rico Reconstruction Administration.

The Puerto Rico Reconstruction Administration, lacking an engineering staff experienced in cement plant design, wisely sought expert assistance in selecting as its consulting engineer, Maj. Charles F. Lewis of the Volunteer Portland Cement Co.; Herbert H. Lauer, formerly of the Atlas Portland Cement Co., as project administrative engineer; and the Treasury Department Procurement Division Engineering staff to pre-

A general view of the new government-financed plant of the Puerto Rico Cement Corp.



Sketch showing the lay-out of the new Puerto Rico plant.

pare detailed plans and specifications. Maj. Edwin C. Eckel, chief geologist of the Tennessee Valley Authority, was engaged to make investigations covering raw materials for plant use.

Rather than wait for the completion of the engineering work, the administration asked for bids in four sections as plans were prepared in order to expedite the actual construction work. A contract for furnishing and installing the principal machinery was let November 12, 1936, for the foundations and structures on February 18, 1937, for additional foundations, superstructures and outdoor electrical equipment on June 11, 1937, and, finally, a contract covering additional mechanical and electrical equipment, services, etc., on September 2, 1937. This procedure worked out very well considering the handicap of required governmental procedure, and if it had not been for a dock strike at San Juan, delaying the delivery of materials, the plant would have been completed several months earlier. Actual construction was started March, 1937, and the plant was virtually completed May 15, 1938.

As the necessary raw materials are available from local sources, it appears that practically any type of Portland cement can be manufactured. In addition to standard Portland cement other grades, such as Type A or B, will probably be manufactured for the construction of hydroëlectric projects.

Iron ore, a mixture of hematite and magnetite, is available from the Juncos mountain district. The mixture will give a metallic-iron content of about 66 per cent. Silica of the highest quality is available adjacent to the plant site. The clay is of sedimentary origin obtained at the clay pit located 1½ mi. from the plant. The range of hills on the site are of limestone and, due to their volcanic origin, these contain pockets of clay similar to that obtained at the clay pit. For this reason it may

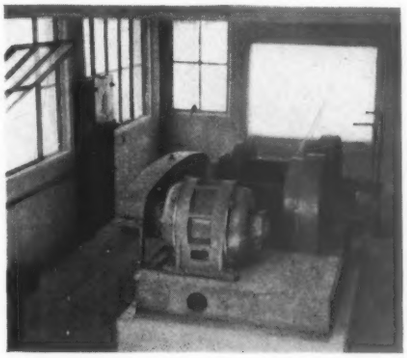
	Limestone	*Clay*
SiO_2	1.42%	58.0%
Fe_2O_3	.65%	8.1%
AL_2O_3	1.30%	20.3%
CaO	53.20%	Trace
MgO	.29%	0.8%
Loss on ignition	43.10%	13.2%

be necessary to supply only a small percent of the clay from the clay pit.

The average limestone and clay is of the following composition:

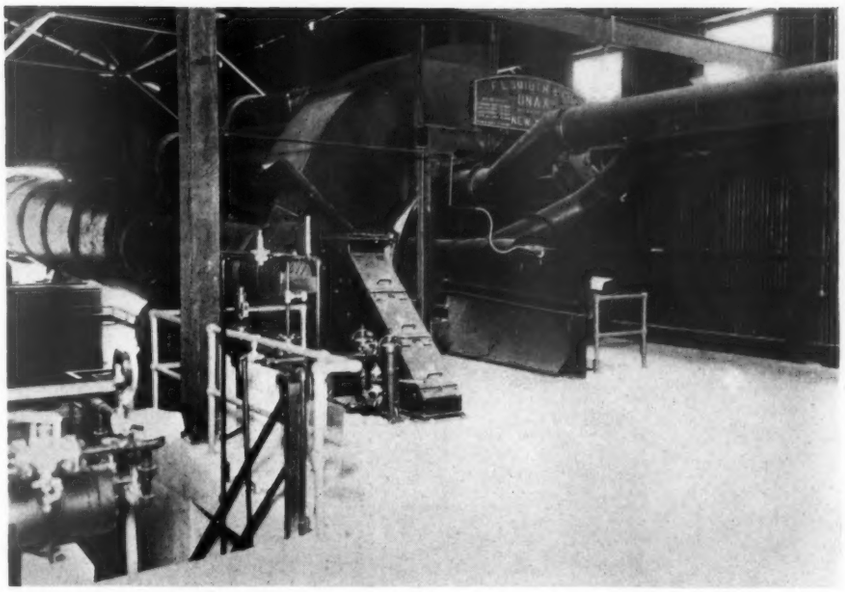
The quarry is located within 500 ft. of the crusher building and serves the hammer-mill by means of a meter-gage industrial-type track, an 8-ton Diesel-engine locomotive and side-dump steel cars. The quarry is being worked in native fashion, with blasting and the breaking down of stone to man size and sledging for man-handing into cars. Crushed stone for road work and other purposes is produced in this manner with further sledging to reduce the stone to the required sizes. At a labor rate of 15c. per hr. stone can be produced for general purposes at a reasonable cost, but it is doubtful whether the present method is adaptable to cement-plant requirements from the standpoint of cost and production. The government has started opening the quarry in native fashion, hoping it will prove satisfactory as it gives employment to the maximum number of men. Undoubtedly the government sooner or later will find it necessary to purchase a power shovel to meet the plant's requirements.

Clay will be obtained from the clay pit and will be delivered a distance of 1½ mi. to the clay storage by trucks.



Motor and hoist which operates the drag scraper in the clay storage.

A Sauerman 1-cu. yd. heavy-duty type Crescent scraper installed at the pit discharges the clay into an elevated truck hopper over an inclined ramp. The hoist house, hopper and ramp are constructed of wood as a portable unit to be moved to various locations on the site as required. The scraper has a capacity of 50 cu. yd. of clay per hr. over an average haul of 200 ft. maximum span. The 60-hp. electric hoist is equipped with a variable-speed control and an auxiliary drum so that the hoist operator can at will deflect the pull-back cable so as to shift the scraper into the material to be excavated.



A view of the kiln, showing the cooler, primary air pipes and oil-firing connection.

The clay ground storage, located immediately in front of the clay wash-mill and between two concrete retaining walls for the railroad fill on each side of the storage, is equipped with a Sauerman 20-cu. ft. Crescent storage scraper designed for stocking out and reclaiming at the rate of 50 tons of clay per hr. over a maximum haul of 100 ft. The wash-mill charging hopper is 15 ft. above the storage-floor and is served by the scraper over an earth-filled ramp. The scraper is furnished with a 30-hp. electric hoist placed in a concrete house at a 5-ft. elevation above the storage floor and at the foot of the large fill in front of the crusher building.

The plant has on hand 2,500 tons of Nova Scotia gypsum, sufficient for about one year's supply. This material, consisting of a full shipload, was purchased for delivery prior to the closing of the ports at Nova Scotia during the winter months, as it was at that time expected that the plant would be ready to operate about February 15. There are gypsum deposits in Santo Domingo, where it is thought arrangements can be made for additional supplies at a saving. Gypsum is delivered from the docks in San Juan by cars to a side track immediately within the clinker end of the large storage building, where it is unloaded into the 2,500-ton capacity gypsum-storage bins, whence it is taken to the feeder bin by a traveling crane.

Stone is delivered from the quarry to the crusher hopper over an industrial railroad of meter-gage. The track is supported on a fill of gradual inclination from the quarry to a large fill at the crusher of sufficient level area to accommodate a complete return loop and also to accommodate delivery by trucks. Stone will be hand-loaded into the 2-cu. yd. Easton side-dump cars of which there are 20. An 8-ton Brookville Diesel locomotive will haul these cars to the crusher building.

Cars of hand-loaded stone are dumped into a 4-ton capacity steel feed hopper furnished with a 42-in. by 12-ft. pan-type Webster feeder discharging into a Pennsylvania steel-built hammer-mill, size SXM 11. If later a shovel is used at the quarry, a considerable amount of clay may be mixed with the stone and may necessitate the addition of a water spray and wiper on the hammer-mill to prevent plugging. The crushed stone is discharged into a 16-ft. by 53-ft. chain-bucket elevator which lifts it to a Link-Belt No. 1-PD-1410 vibrating screen in closed-circuit with the crusher, delivering the stone through a spout to the stone-storage building at the rate of 75 to 100 tons per hr. of nominal ¼-in. and under. This product is rehandled for storage and delivery to the feeder bin by the traveling crane. Approximately 11,000 tons of crushed stone can be stored in the storage building.

The clay-wash unit is constructed entirely of concrete. The wash-mill is a 26-ft. octagonal basin 10 ft. deep, equipped with an F. L. Smidth standard wash-mill agitator. The floor and lower 4½ ft. of the walls are protected by a granite-block lining. A 5-ft. by 10-ft. concrete hopper, built integral with the basin and supporting the head post of the Sauerman storage scraper, serves the mill with clay. The clay slurry is fed by gravity into a covered concrete storage tank 20 ft. in diameter and 10 ft. deep, equipped with an F. L. Smidth single mechanical-and-air agitator. Constructed integrally with the

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE PUERTO RICO PORTLAND CEMENT CORP., CATANO, PUERTO RICO—PART I

(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

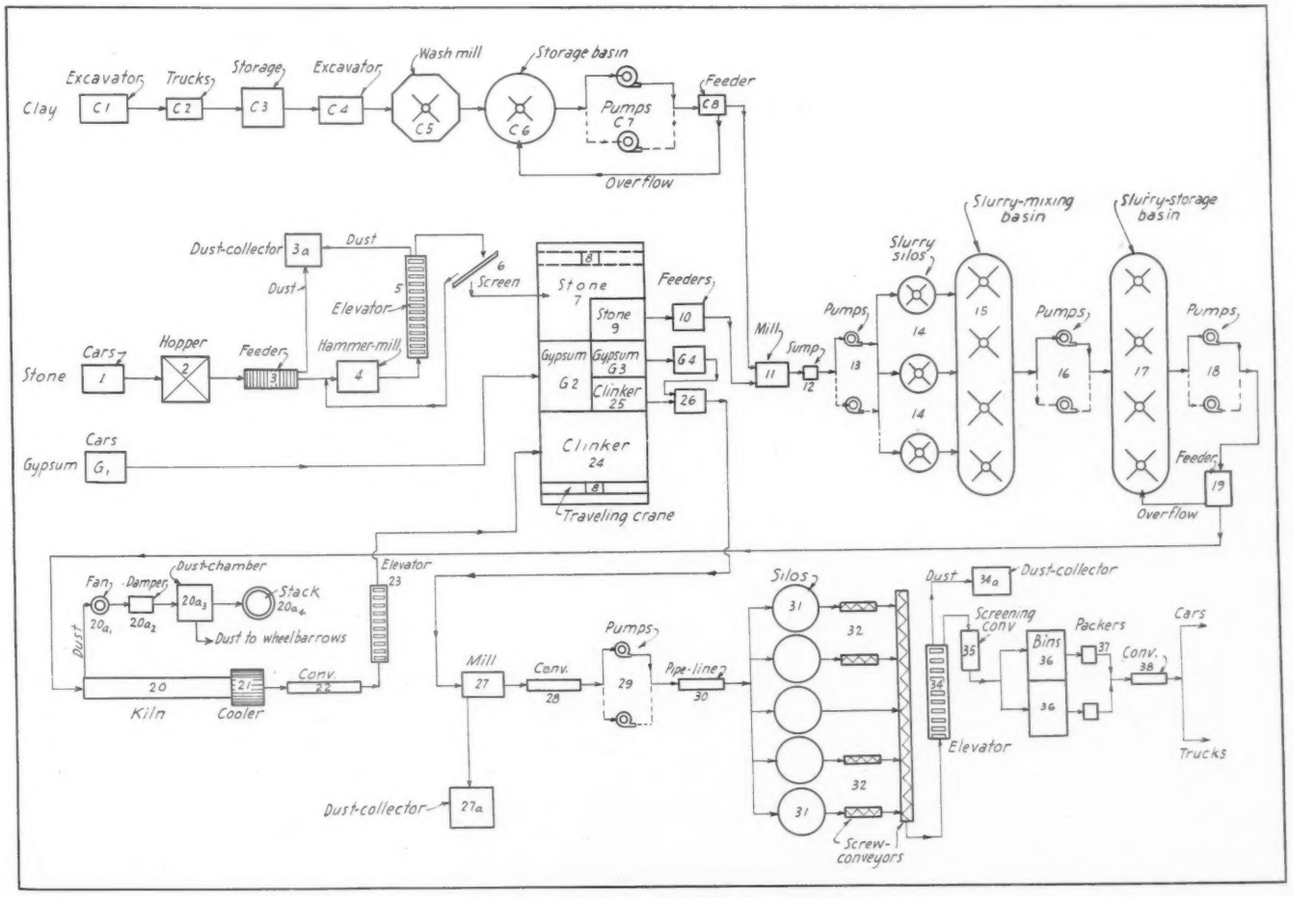
Operation	Key	Equipment	Make	Model No., Size Capacity or Type	Power Source	Power Transmission
Limestone quarrying		Jack-hammers (3)	Ingersoll-Rand	JA-45		
		Wagon drill	Ingersoll-Rand	Type D	Air	
		Locomotive	Brookville	8-ton Diesel		
	1	Cars (20)	Easton	2 cu. yd. side-dump steel		
Limestone crushing	2	Hopper		4-ton, steel		
	3	Apron feeder (Dust to 3a)	Webster	Pan, 42 in. by 12 ft.	5 hp. Allis motor	Falk 34 Du reducer
	4	Hammer-mill	Pennsylvania	SXM-11	300-hp. Elec. Mchy. & Mfg. Co. motor	Direct
	5	Elevator (Dust to 3a)	Webster	Chain-bucket, 16 in. by 53 ft.	20-hp. Allis motor	Falk 70RZ reducer
	6	Vibrating screen (Throughs to 7, oversize to 4)	Link-Belt	1-PD-1410	5-hp. Allis motor	V-belt
Limestone storage and feeding	7	Storage		11,000-ton steel shed		
	8	Traveling crane (Stone to 9; gypsum to G3; clinker to 25)	P&H	8-ton, 4-motor, 2½-cu. yd. HB-H, electric traveling bucket crane; 80-ft. span, 40-ft. lift, 280-ft. runway	50-hp. P&H motors (2) 10-hp. P&H motor 10-hp. P&H motor	
	9	Bin		Concrete, 200-ton		
	10	Feeder	Schaffer	20-ft. by 6 ft. special-length Poidometer	3-hp. G-E motor	Windfield-Smith motor-reducer, chain
Raw grinding	11	Mill	F. L. Smidth	Unidan No. 2288, 3-compartment, 8 ft. by 29 ft.	600-hp. synchronous Electric Mach. & Mfg. Co. motor	Direct
	12	Sump		Concrete		
	13	Pumps (2)	Wilfley	4-in. centrifugal	25-hp. Allis motor	Direct
	14	Silos (3)		Concrete, 20 ft. dia. by 20 ft. high, 600-bbl. each		
		Agitators (3)	F. L. Smidth	Mechanical-and-air	25-hp. Allis motor	Falk 7½ DA reducer
Slurry mixing, storing and and feeding	15	Mixing basin		Concrete, 1,800-bbl. capacity 51½ ft. long (circular ends), 20 ft. wide, 20 ft. deep		
		Agitators (4)	F. L. Smidth	Mechanical-and-air, 20 ft. diam	25-hp. Allis motor	Falk 7½ DA reducer
	16	Pumps (2)	Wilfley	4-in. centrifugal	25-hp. Allis motor	Direct
	17	Storage basin	M. A. Long	Concrete, 1,800 bbl., 51½ ft. (circular ends), 20 ft. wide, 20 ft. deep		
		Agitators (4)	F. L. Smidth	Mechanical-and-air, 20 ft. diam.	25-hp. Allis motor	Falk 7½ DA reducer
	18	Pumps (2)	Wilfley	3-in. centrifugal	15-hp. Allis motor	Direct
	19	Feeder (Slurry to 20, overflow to 17)	F. L. Smidth	Spiral-scoop type	3-hp. G-E motor	Falk 5DA reducer, chain drive
Burning, clinker-cooling and storing	20	Kiln	F. L. Smidth	8½ ft. by 7½ ft. by 306 ft.	60-hp. G-E variable	Falk, 12RA
	21	Cooler	F. L. Smidth	Single-tube, 10-cyl. Unax.	Attached to kiln shell	
	20a1	Draft fan	F. L. Smidth	No. 27	30-hp. Allis motor	Silent chain
	20a2	Louver damper	F. L. Smidth		½-hp. motor	Janette motor-reducer and chain
	20a3	Dust chamber (Dust to wheelbarrows)	F. L. Smidth	Steel		
	20a4	Stack	Custodis	Concrete, 150 ft. high, 7 ft. inside diam.		
	22	Apron conveyor	Webster	24 in. by 18 ft.	5-hp. Allis motor	Falk 5DA reducer
	23	Elevator	Webster	Chain-bucket, 16 in. by 35 ft.	20-hp. Allis motor	Falk 70DA reducer
	24	Storage (To 8, then to 24)		Steel shed, net capacity 25,000 bbl.		
Finish grinding	25	Clinker bin (From 40)	M. A. Long	Concrete, 1000-bbl.		
	26	Feeder	Schaffer	20 in. by 6 ft., special-length Poidometer	3-hp. G-E motor	Windfield-Smith motor-reducer, chain
	27	Mill	F. L. Smidth	Unidan No. 2288, 3-compartment, 7¼ ft. diam., 29 ft. long	600-hp. synchronous Elec. Machy. & Mfg. Co. motor	Direct
	28	Conveyor	Webster	Screw, 16 in. by 22 ft.	10-hp. Allis motor	Falk 34 DU reducer
	29	Cement pumps (2)	Fuller	6-in. Fuller-Kinyon Type H	40-hp. Allis motor	Direct
	30	Pipe	Fuller	5 in. by 300 ft.		
Cement storing, handling and packing	31	Stock-house	M. A. Long	4 silos, 30 ft. by 60 ft., 1 interstitial bin; 45,000 bbl.		
	32	Conveyors (4)	Webster	Screw, 16 in. by 48 ft.	10-hp. Allis motors (4)	Falk 34DU reducer
	33	Conveyor	Webster	Screw, 16 in. by 54 ft.	10-hp. Allis motor	Falk 34DU reducer
	34	Elevator (Dust to 34a)	Webster	Chain-bucket, 16 in. by 57 ft.	20-hp. Allis motor	Falk 70DZ reducer
	35	Screening conveyor (Screenings to bags)	Webster	Screw, 20 in. by 17¾ ft.	5-hp. Allis motor	Falk 28DU reducer
	36	Packing bins (2) (Spillage to 36a, dust to 34a)		Steel		
	36a	Spillage conveyor (To 34)	Webster	Screw, 16 in. by 26 ft.	10-hp. Allis motor	Falk 28DU reducer
	37	Packers (2) (Dust to 34a)	Bates	3-tube	25-hp. Westinghouse motor	Direct
	38	Loading belt (To trucks or cars)	Webster	36 in. 28 ft. reversible	5-hp. Allis motor	Falk 56RZ reducer, chain
Clay excavation, washing and feeding	C1	Drag-excavator	Sauerman	SS-1422-AX, 1-cu. yd.	60-hp. G-E motor	
	C2	Trucks				
	C3	Storage				
	C4	Drag-excavator	Sauerman	US-205 20-cu. ft.	30-hp. G-E motor	Direct
	C5	Wash-mill		26 ft. octagonal, 10 ft. deep		
		Agitator	F. L. Smidth	Mechanical	75-hp. Allis motor	Falk 9HC reducer
	C6	Storage basin		20 ft. diam., 11 ft. high		
		Agitator	F. L. Smidth	Mechanical-and-air	10-hp. Allis motor	Falk 44DC reducer
	C7	Pumps (2)	Wilfley	3-in. centrifugal	10-hp. Allis motor	Direct
	C8	Feeder (Clay slurry to 11)	F. L. Smidth	Tank-type		
Gypsum receipt and handling	G1	Cars or trucks				
	G2	Storage bins (2) (To G3 through 8)		Concrete, 2,500-ton		

(*Continued on page 39*)

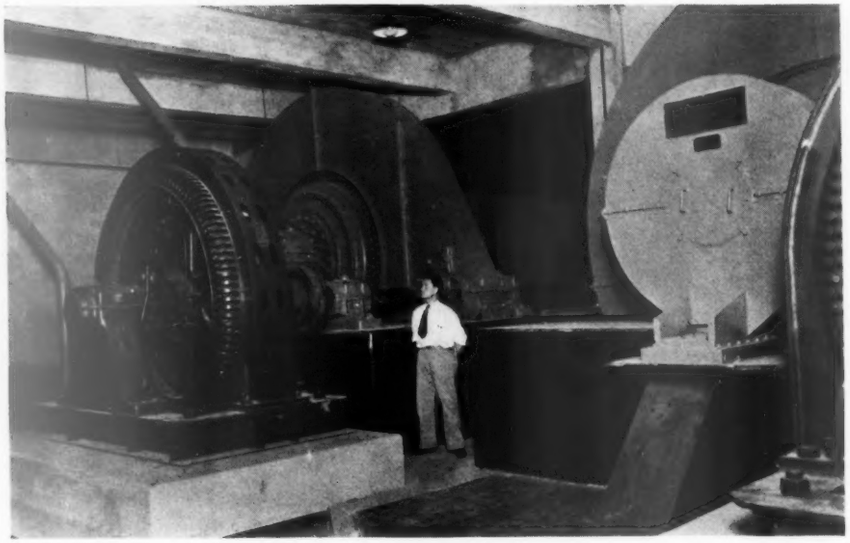
TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE PUERTO RICO PORTLAND CEMENT CORP., CATANO, PUERTO RICO—PART II

(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key	Equipment	Make	Model No., Size Capacity or Type	Power Source	Power Transmission
	G3	Gypsum bin	M. A. Long	Concrete, 100-ton		
	G4	Feeder (To 26)	Schaffer	20 in. by 6 ft., special-length Poidometer	3-hp. G-E motor	Windfield-Smith motor-reducer, chain
Oil storage, supply and firing	O1	Tank cars				
	O2	Pumps (2)	Roper	No. 5	15-hp. G-E motor	Chain
	O3	Storage		10,000-bbl.		
		Auxiliary tank		3,000-gal., steel		
		Boiler	Mears Kane Ofeldt	25-hp. MKAYO, vertical water-tube coil type		
	O4	Oil-burner	Simplex	Type HO, Size 2	½-hp. G-E motor	
	O5	F. L. Smidth system	Schutter Koerting			
	O6	Oil-feed pumps (2)	Schutter Koerting		5-hp. Allis motor	Falk 22LI reducer
		Boiler	Mears Kane Ofeldt	10-hp. MKAYO vertical water-tube coil type		
	O7	Oil-burner	Ray	Type AP-12 size O	½-hp. G-E motor	
		Primary-air blower	F. L. Smidth	Type 43 KBE	10-hp. Allis motor	Direct
Electric-distribution system		Sub-station transformers (3)	Westinghouse	Single-phase units; each 1,000-kv.-a., 22,000-38,060-v., 2300-v., 60-cycle		
		Switchboard	Elec. Machy.	5-panel, 2,200-v. a. c., 500-kv.-a.		
		Transformers (3)	Westinghouse	500-kv-a., type SL., 2,300-v. primary, 440-v. secondary		
		Switchboard	G-E	4-panel 440-v.		
		Transformers (3)	Westinghouse	25-kv.-a.-Lighting, type 5		
		Switchboard	G-E	3-panel d.c.		
		Motor-generator set	G-E	2-unit synchronous d.-c.	125-hp., 75-kv.-a.	
		Motor-generator set	G-E	2-unit induction d.-c.	50-hp., 30-kv.-a.	
		Gasoline-engine fuel tank	Hall Scott	Model 200-0-132, 132-hp., 1,000-gal.		
Compressed-air supply		Compressors (2)	Fuller	Type C-120, single-stage rotary	75-hp. Allis motors (2)	Direct
		Air-receiver		4½ ft. by 14 ft.		
		Compressor	Fuller	Type C-100, two-stage rotary		
		Air-receiver		3 ft. by 8 ft.	100-hp. Allis motor	Direct
Water-supply		Well pump	Byron-Jackson			
		Water tank	M. A. Long	Concrete, 20 ft. diameter, 20 ft. high, 45,000 gal.		
		Recirculating water pump	Gould	Size 1M, 25 gal. per min.	⅛-hp. G-E	
		Water-softener	Grover	Type C, 1½, 1,150 gal.		
		Boiler-feed pump	Gould	Centrifugal. Size 1¼ H, 30 gal.	2-hp. G-E motor	
Dust-collection	3a	Dust-collector	Sly	No. 34. Type EC 145	½-hp. and 3-hp.	
	27a	Dust-collector	Sly	No. 34. Type EC 145	½-hp. and 3-hp.	
	34a	Dust-collector	Sly			



Flow-sheet of operations at the Puerto Rico plant.



The finishing and raw mills from the drive ends, showing the 600-hp. synchronous motors.

storage tank and wash-mill is a two-story-with-basement concrete building, the basement of which is equipped with two 3-in. Wilfley slurry pumps, one acting as a spare, to serve the raw mill with clay slurry. The first story contains the storage-tank agitator power unit, while in the second story is located the wash-mill power unit.

The crushed stone, clinker and gypsum storage building is 280 ft. long (of seven 40-ft. bays) and 82 ft. wide, and is divided into a stone storage of 11,000 tons capacity and a clinker storage of 45,000 bbl. capacity by the concrete gypsum-storage bins of 2,500-ton capacity which occupy the center 40-ft. bay of the building.

The gypsum bins are only 60 ft. long, leaving 22 ft. of the storage-building width for the elevated concrete feeder bins, which are 22 ft. wide and 80 ft. long and extend 40 ft. into the stone-storage end of the storage building. There are in this series of feeder bins four large bins of approximately 200-ton capacity and four smaller bins of 100-ton capacity by stone measure. At present two large bins and one small bin will be used, with the others held in reserve, for iron and sand to care for special cement requirements and for doubling the plant capacity. The storage building is a steel structure covered with Robertson Protected Metal and is supported on 38-ft. high concrete columns and the gypsum and feeder bins. All the storage and feeder bins of the storage building are served by a P & H traveling crane of 8-ton capacity equipped with a 2½ cu. yd. Hayward bucket. This crane has an 80-ft. span, 40½-ft. lift, a travel of 280 ft., and is equipped with four motors for a main hoist speed of 130 ft. per min., an auxiliary-hoist speed of 130 ft. per min., a trolley speed of 200 ft. per min., and a bridge speed of 350 ft. per min. The crane is equipped with a Farval automatic lubricating system.

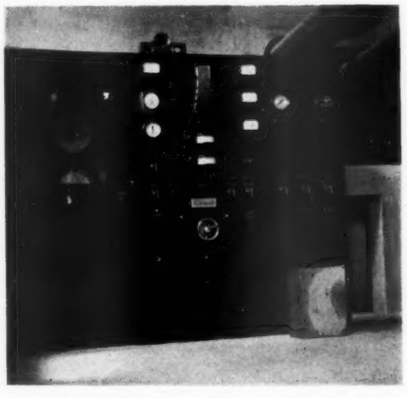
At present one 200-ton bin for crushed stone serves the raw mill by means of a 20-in. by 6-ft. Schaffer poidometer 30 ft. long, while one 200-ton bin and one 100-ton bin supply the finishing mill with clinker and gypsum respectively by means of similar-size poidometers, except that the gypsum poidometer is 12 ft. long and is set high to discharge on the clinker poidometer.

The mill and kiln discharge departments are built as one unit, the latter portion being of structural steel and Robertson Protected Metal covering, while the former is of similar construction over the mills but is entirely concrete over the mill motors, switchboard and compressor rooms. Concrete construction was chosen for this portion of the mill building as an extra precaution against damage to expensive equipment by possible hurricanes.

There is one raw mill and one finishing mill, both of the same size, so that, in case the plant is duplicated, the present raw mill can be converted into a finishing mill. Both mills were furnished by F. L. Smidth, the raw mill being a Unidan No. 2288, 7¼-ft. in diameter and 29 ft. long. It has three compartments, two 8 ft. long and one approximately 13 ft. long and of a capacity not less than a slurry equivalent of 62 bbls. of clinker per hr. for specified grinding conditions. The normal grinding-bodies charge of the mill is 39 tons, with balls in the first two compartments and Cylpebs in the last compartment. The finishing mill is similar to the raw mill except that the normal charge of grinding bodies will be 49 tons and it will have a capacity of 65 bbl. of cement per hr. for specified grinding conditions. Both mills are driven through spur gears and pinions by 600-hp. Electric Machinery & Mfg. Co. synchronous motors.

The slurry from the raw mill has a moisture content of about 34 per cent. and is discharged into a concrete pump-sump. Two 4-in. Wilfley centrifugal slurry pumps, one of which is a spare, force the slurry into the three slurry-blending silos, which are 20 ft. in diameter and 20 ft. high with an 18-ft. understory and a capacity of 600 bbl. each. The slurry is agitated by F. L. Smidth single mechanical-and-air agitators, one in each silo, driven by a common power unit.

The material from the silos is drawn off by gravity into a covered concrete correcting basin 51½ ft. long (with semi-circular ends of 10-ft. radius), 20 ft. wide and 20 ft. deep. It has a capacity of 1,800 bbls. The slurry in this basin is agitated by an F. L. Smidth quadruple mechanical-and-air agitator. From the correcting basin the slurry is pumped through two 4-in. Wilfley centrifugal slurry pumps, one used as a spare, into the storage basin, which is of the same size, construction and equipment as the correcting basin. Slurry is fed from this storage basin by two 3-in. Wilfley slurry pumps, one used as a spare, into an F. L. Smidth spiral-scoop type slurry feeder, measuring the amount of slurry going to the kiln. An excess of slurry is always pumped to the feeder trough to insure a sufficient supply and the overflow goes back to the storage basin by gravity. The amount of slurry fed into the kiln



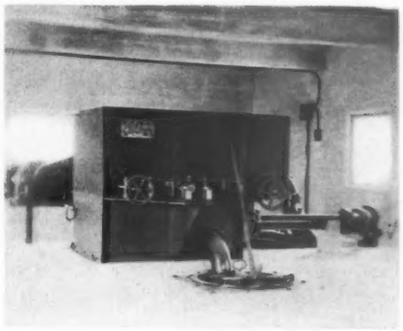
Instrument board which controls the kiln.

can be adjusted during kiln operation by changing the position of an adjustable diaphragm of the feeder.

The F. L. Smidth kiln is of the latest type and is equipped with a complete system of controls. It is 306 ft. long and is divided into three cylindrical sections, 8½ ft. in diameter in the drying zone, 7½ ft. in diameter in the calcining zone, and 8½ ft. in diameter in the burning zone and approximately 105, 120 and 76 ft. long, respectively. The

kiln has five tires mounted on single oil-lubricated bearing rollers and has thrust rollers at the middle tire. A Smidth counter-weighted air-seal at the stack end of the kiln prevents the admission of air at this point. The geared drive ring is connected to the kiln shell near its center by spring plates and is driven through a Falk 12 RA speed-reducer by a 60-hp. General Electric d.c. motor having a speed of from 400 to 1,200 r.p.m. On the motor reducer shaft is a kiln-revolution counter.

The first 60 ft. of the burning zone



Spiral scoop-type slurry feeder, showing discharge to measuring hopper.

is lined with the 70 percent. high-alumina bricks and the remainder with firebricks. Johns-Manville 2½-in. thick Superex lining was used for insulating 135 ft. of the kiln immediately beyond the section lined with the high-alumina bricks.

There is an F. L. Smidth patented electrical synchronized drive for the slurry feeder. This consists of an alternator driven by the kiln motor, whereby the frequencies of the alternator-generated current are a direct function of the kiln speed, and an alternating-current motor driving the feeder, which is operated in synchronism with the alternator. Thus there is maintained a constant relation between the kiln speed and the rate of slurry feed.

The feed end of the kiln is equipped with a 60-ft. Smidth regenerative chain system to facilitate heating of the slurry and the absorption of slurry moisture by the hot kiln gases, to reduce the exit temperature of these gases, and to lower the dust loss. The kiln has a Smidth steel-plate draft fan and a Smidth automatic motor-operated louver damper.

The kiln is fitted to a steel dust chamber and is equipped with an F. L. Smidth patented multiple gas-discharge system. This consists of a steel dust chamber 14 ft. by 12¼ ft. by 28 ft. high with a conical hopper bottom and a multiple gas discharge for the upper end of the kiln shell to facilitate working of the kiln to maximum capacity without spilling slurry and to decrease the resistance to the gases. The entire dust chamber is lined with firebricks.

The kiln gases are discharged at a temperature of about 300 deg. F. through the dust chamber into the kiln stack. The hopper under the dust chamber allows the removal of collected dust. The reinforced-concrete kiln stack was erected by the Alphons Custodis Chimney Co. and is 150 ft. high with an interior diameter at the top of 7 ft. The stack is lined with firebricks for the first 76 ft. of its height and the remainder with hard-burned common bricks made up of two consecutive independently supported sections.

The kiln is designed for an output of 44½ bbl. of clinker per hr. and for a fuel efficiency of 1,000,000 B.t.u. per bbl., based on a slurry with 34 percent. moisture content and a crude oil having a calorific value of approximately 18,500 B.t.u. per lb. and with a specific gravity of 0.877. It is further guaranteed that for moisture contents of the slurry up to and including 38 percent. the increase in heat consumption for each per cent. of water will not exceed 25,000 B.t.u.

The F. L. Smidth master kiln-control board is located on the burner's platform in front to the right of the kiln center-line and gives the burner absolute control over all the operations entering into the burning of the cement. There are instruments of many kinds—indicators, meters, recorders, switches, lights, etc., for temperatures, speeds, drafts, slurry-feeder operation, louver position, oil consumption, and power input to the kiln and its accessory equipment. There are CO_2 and CO plus H_2 indicators, louver-damper controls and indicators and interplant telephone, alarm devices, etc.

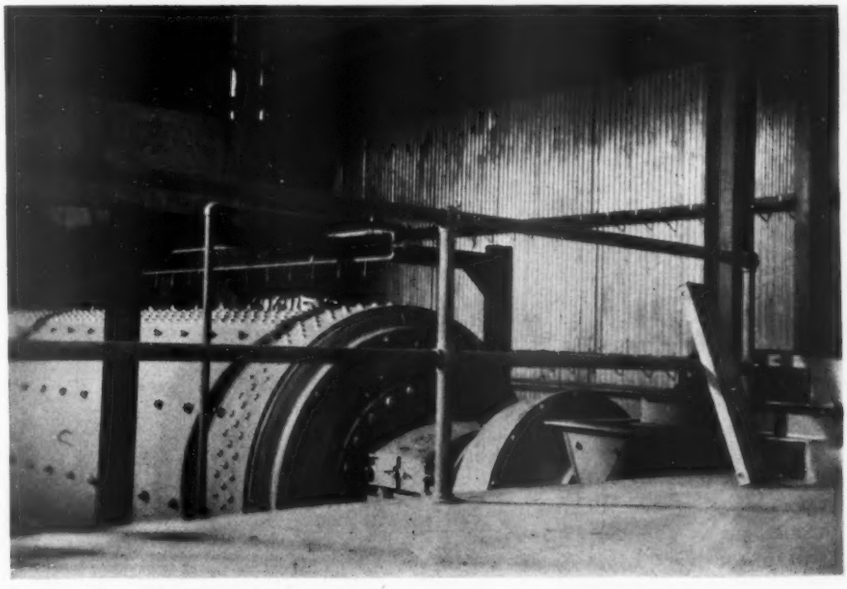
The Smidth kiln is equipped with a Smidth Unax cooler, consisting of ten cylindrical coolers equipped with chains to agitate the clinker and assist in dissipating heat. These are placed in a single circular row paralleling the periphery of the kiln. The cooler is guaranteed to cool the clinker leaving the kiln at about 2,800 deg. F. to a temperature of about 300 deg. F. By the time the clinker has been conveyed, elevated and discharged into the storage the temperature will be reduced to below 250 deg. F.

The finished cement is discharged from the finishing mill into a 16-in. screw-conveyor 22 ft. long, which delivers cement to either one of two 6-in. Type H Fuller-Kinyon pumps. These transport the cement under the railroad tracks and up to the tops of the silos through a transport pipe system 350 ft. long.

The cement stock-house consists of four 30-ft. diameter silos 60 ft. high with one interstitial bin giving a total capacity of 45,000 bbl. The stock-house has a 12-ft. basement to accommodate four 16-in. by 45-ft. long cross screw-conveyors and one 16-in. by 54-ft. long screw-conveyor common to the four conveyors. The latter delivers cement to a 16-in. by 57-ft. chain-bucket elevator which discharges it into a 20-in. by 17¾-ft. long screw screening conveyor. This feeds the material into one or two packing bins located immediately above the two 3-tube bag-packers. The bags of cement are conveyed to either side of the pack-house over a 36-in. by 28-ft. long reversible belt-conveyor for either car or truck loading.

The kiln and boilers will be fired with Bunker C oil, delivered from tankers to the site in tank cars. A steel storage tank 56 ft. in diameter, and 23 ft. high and of 10,000-bbl. capacity is located approximately 300 ft. from the

(Continued on page 84)



Finishing mill, showing feed hopper and water-cooling spray.

By W. E. TRAUFFER

Rebuilt Universal Atlas Plant at Hudson Now in Full Operation

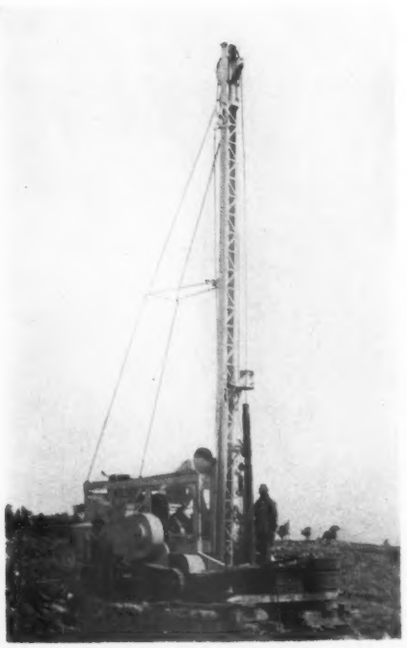
The Universal Atlas plant at Hudson, N. Y., with new storage and mill buildings at right. In the center are the raw-material blending silos.

TWO years ago the Universal Atlas Cement Co. announced an extensive improvement program which, over a period of years, was to affect most of its nine cement plants. Work was first begun on the company's plant at Greenport near Hudson, N. Y. and this has been almost completely rebuilt without any interruption of production. The rebuilding program was so planned that each new department of the plant was built while the old department continued in production. After the new department was in operation the old department was discontinued, later to be dismantled.

The result is a modern, efficient cement plant new in all save a few details. The kiln department has been modernized, but the original kilns remain. Rebuilding of this department is also planned. The existing cement-storage silos also have been retained. A few old buildings remain to be torn down and after this work is completed new shops, warehouses and a new packhouse will be built. In rebuilding this plant, its old capacity of 7,200 bbl. daily has been retained, but its efficiency has been improved in every way.

This dry-process plant on the east bank of the historic Hudson River is located on U. S. Highway 9E a few miles south of Hudson, N. Y. This is one of the heaviest traveled highways in the country and carries the bulk of the commercial and tourist traffic from the New York City area to the Adirondacks, New England, Montreal and upstate New York. The plant in fact spans this highway as the quarry and crushing plant and the main plant are across the road from each other. In redesigning this plant, every effort was made to design for beauty as well as utility and the result is a valuable advertisement for the company's product. The entire property is to be landscaped, and from the results already evident, the finished plant will be a thing of beauty.

The vine-covered plant office.

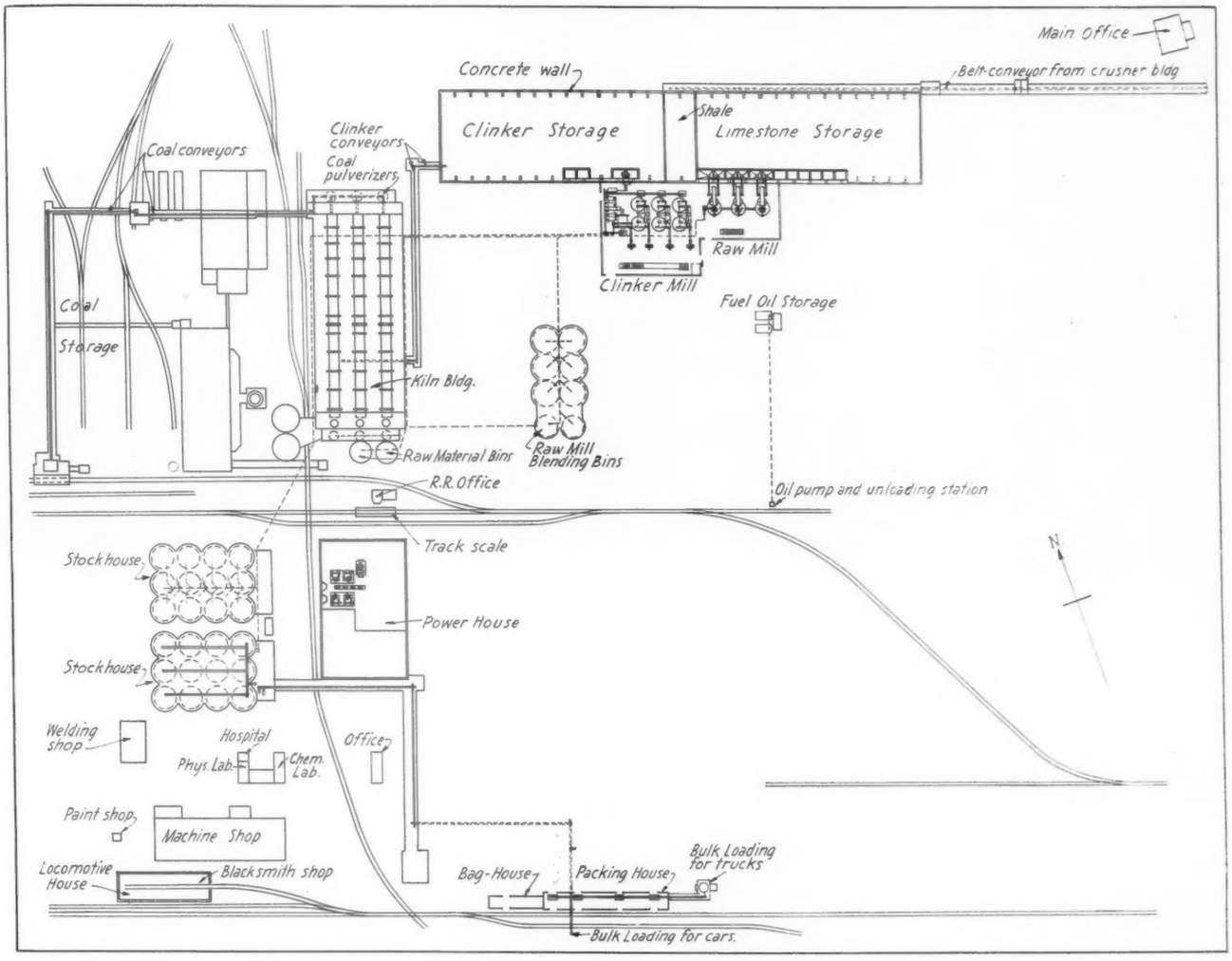


The 9-in. crawler-mounted electric well drill preparing for another blast.

In 1902 the L. C. Smith interests built a small plant in Hudson on the river which was abandoned when the present plant was built. The present Hudson plant was built in 1909 by the Atlas Portland Cement Co., which was merged with the Universal Portland Cement Co. in 1930 to form the present company. In 1910 the old plant was dismantled except for the stockhouse and packhouse which are now used for barge loading.

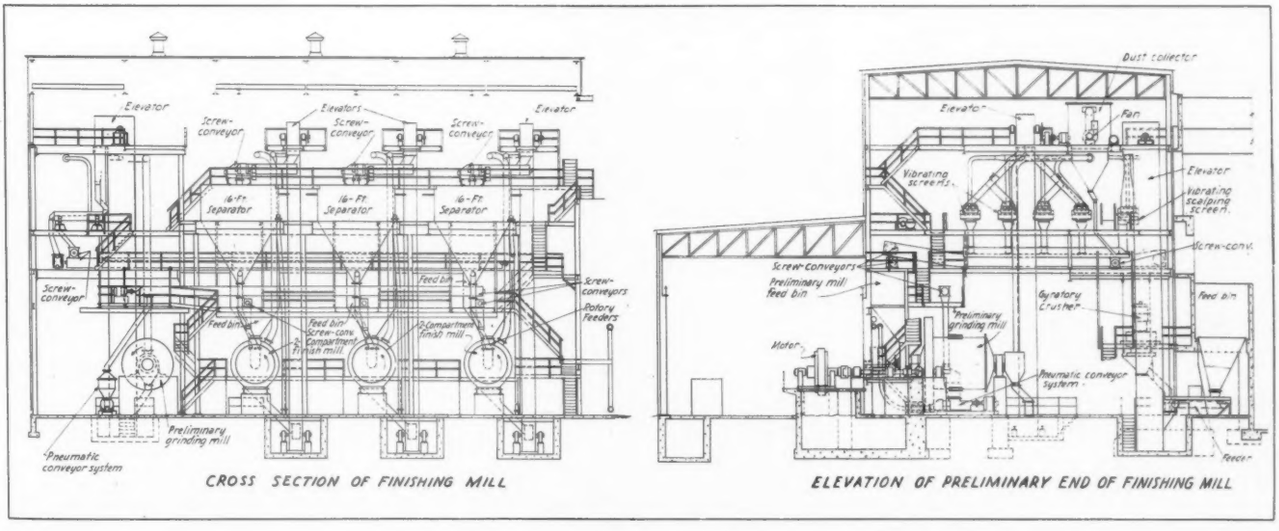
The first step in the company's program at Hudson was the modernization and electrification of the quarry early in 1936. The old steam shovels were replaced by two electric shovels, an electric well drill and a wagon drill. The old kilns were improved by the installation of direct-firing coal mills, new drives, etc., and a pneumatic system was also installed for transferring cement from cars loaded at the plant to the stockhouse and packhouse at the river for boat shipment.

Actual rebuilding of the plant was begun late in 1936, with the erection of a new crushing building and a belt-conveyor system connecting it to a new storage building for raw materials, clinker and gypsum. This part of the plant was in operation in October, 1937. Operation of the entire plant was suspended on December 1 for the winter and on March 15, 1938 the entire plant with its new departments was put into full operation.



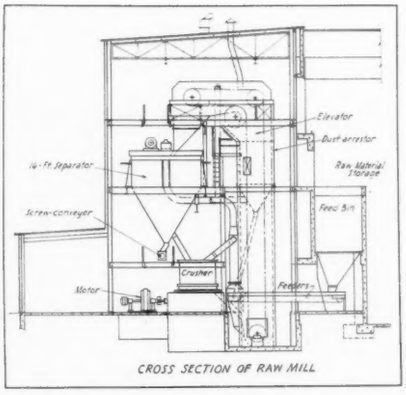
Plan drawing of the plant showing the new layout and some of the old buildings which are to be dismantled.

The quarry is located about ½ mi. east of the plant, and its floor is about 6 ft. lower than the dumping floor of the crusher building. The quarry contains three different grades of limestone varying in carbonate content from 65 to 95 per cent. The face is about 90 ft. high with a 12 ft. ledge of very hard cap rock. A wagon drill is used on this ledge and a 9-in. crawler-mounted electric well drill drills holes the full depth of the face. All of these



Elevation drawings showing the compact and efficient design of the finish-grinding department.

The four screens which operate in closed circuit with the preliminary finish-grinding mill.



Elevation of the raw-material grinding department showing the overhanging type of elevator used.

holes are fired at once with Cordeau. Stone is loaded by two 85-B electric shovels with 2½-cu.yd. dippers and Ward-Leonard controls into 12-cu. yd. Western side-dump cars. A loop-track system is used in the quarry and trains of five cars each are pushed to the crushing building by two 20-ton steam locomotives.

At the crushing building the cars are pushed out on a trestle extending through and beyond the building with a slight grade upward. Leaving this train there, the locomotive returns to the quarry with a train of empty cars for another load. A pneumatically-controlled car retarder on one rail stops the cars at the primary crusher for dumping as the train rolls down-grade through the crusher building. A pneumatic dumper designed by the company dumps the cars and returns the bodies to loading position. When all of the cars are emptied the train is released and rolls by gravity through a spring switch to the return track of the quarry loop out of the way of the incoming train. No manual switching is required.

The rock is discharged from the cars into the 42-in. primary gyratory crusher which reduces quarry-run stone to 6 in. and under at the rate of 600 tons per hr. The product of this crusher is discharged on a 60-in. by 25-ft. inclined apron-conveyor with manganese-steel flights which in turn feeds a hammer-mill secondary crusher. The stone has a free drop of 9 ft. into this crusher so that some of the stone gets below the ends of the hammers, considerably enlarging the effective area of each hammer and reducing the wear. The hammer-mill is reversible and is driven by a reversible motor. Instead of turning the hammers at intervals to get the maximum wear from them, it is only necessary to change the direction of rotation once daily. The cages in the hammer-mill can be adjusted while in operation by means of hand wheels.

The tail of the apron conveyor is on a pivoted support so that it can be lifted up out of the way when it is necessary to work on the hammer-mill. This can be done by a 5-ton electric overhead crane which serves the entire crusher building but is used chiefly for dislodging stone in the primary crusher. It is operated by a drum controller on the crusher floor. This crane has a 30-ton bridge and is designed so that a sheave can be reeved from it to the 5-ton trolley making this in effect a 30-ton crane. This arrangement will be used when making heavy repairs. A cloth screen dust collector is connected to all of the machinery in the crusher building. The collected dust is combined with the product of the hammer-mill. The primary crusher is driven through Texropes by a 300-hp. motor and the hammer-mill is direct driven by a 700-hp. synchronous motor. This department in five 8-hr. days produces enough stone for seven full days of plant operation.

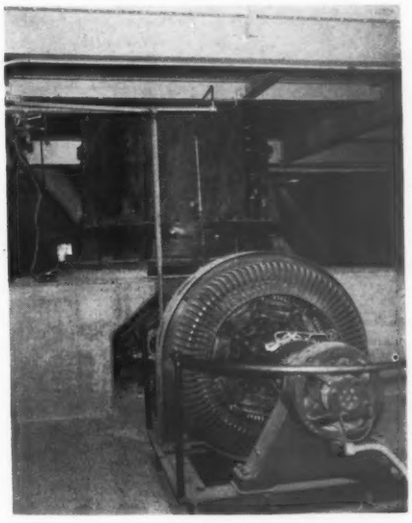
The minus ¾-in. product of the hammer-mill is carried on a 30-in. by 1,200-ft. belt conveyor (No. 1) to a transfer house. A 30-in. by 100-ft. belt con-

One of the six 16-ft. air separators in closed-circuit with the three finish-grinding mills.

veyor (No. 2) carries the stone to the storage building. This conveyor is equipped with a Weightometer which records the amount of stone stored. Both of these conveyors are completely inclosed and are carried for their full length on steel bents on concrete foot-

The crusher building with conveyors to plant in right background.

ings. A 30-in. belt conveyor on 300-ft. centers (No. 3) inside the storage building is equipped with a traveling tripper. The stone is discharged by this tripper into the stone storage section of the building. The stone is discharged for 15-min. periods at fourteen equidistant points along the length of this section and is spread out in windrows by an overhead crane. In reclaiming the limestone from storage it is picked up by the crane in four rows equally spaced across the width of the building.



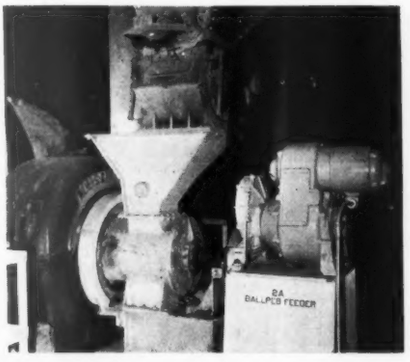
One of the raw-material drying and grinding mills.

This results in an effective preliminary blending.

Shale is quarried from a deposit near the limestone quarry. Because of the small percentage required this quarry is operated only one day every two months of operation. The same loading, hauling and crushing equipment

One of the two 2½-cu.yd. electric shovels loading limestone into cars. Sled for power cable is at right.

is used and the shale is discharged from the tripper belt conveyor in a separate section of the storage building with a capacity of 4,800 tons. The same overhead crane stores and reclaims the shale in the same manner as the limestone.



The variable-speed reducer drive of rotary feeder supplying finish-grinding mill.

The storage building is 560 ft. long and 100 ft. wide and is constructed entirely of heavily-reinforced concrete with a barrel roof of 105-ft. span. This building is divided into three sections for the storage of 33,000 tons of limestone, 4,800 tons of shale and 175,000 bbl. of clinker. In the corner of the clinker storage is a 2,200-ton gypsum bin. Two 15-ton 100-ft. span overhead traveling cranes with 4-cu.yd., 4-line clamshell buckets traverse the length of this building, one being used for limestone and shale and the other for clinker and gypsum.

The rock storage crane feeds the stone and shale into three pairs of 95-ton mill feed bins. Three sets of Feedoweights proportion stone and shale from these bins into three super-capacity bucket elevators rated at 880 t.p.h. each. These elevators are of the overhanging type and the buckets act as scrapers on the horizontal leg. They are concrete inclosed. Each elevator discharges into a 16-ft. air separator. These are designed to carry a circulating load up to 1,000 per cent. The tailings from the separators go to three No. 366 B & W raw-grinding mills which are driven by direct-connected 600-hp. synchronous motors. The product of the mills is returned by the same elevators into the separators. The air in these closed circuits is heated by three oil-fired furnaces thermostatically controlled to dry the material as it is ground. The temperature in the separators averages 300 deg. F. All of this equipment is fully insulated with Johns-Manville "Banroc" built-up rock wool.

Each of the three grinding circuits grinds 35 tons per hr. of kiln feed from ¾-in. minus to a fineness of 92 per cent. through 200 mesh. The moisture content is reduced from 2½ per cent. to .2 per cent. The air vented from each circuit to get rid of the moisture is passed through a cloth screen dust collector and the collected dust is returned to the elevator in the circuit.

The gyratory clinker crusher with elevator and proportioning equipment at right.

THE MODERN AGGREGATES PLANT

is one in which every unit of equipment is selected after consideration of the capacity of every other unit. Thus choke points are avoided. Production flows in a smooth, uniform, economical stream.

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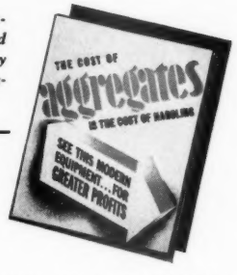

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The fine product of the separator is finished raw material and this is carried by an 18-in. screw conveyor to a 10-in. Type H Fuller-Kinyon pump. This pump is a part of the raw-blending system and pumps this material into six 30-ft. by 62-ft. 6 in. concrete silos with cone-shaped bottoms. One silo is filled while material is being drawn and blended from the other five silos. The material is withdrawn through a single opening in the bottom of each silo so that a "rat-hole" is formed and the material slicing off results in a further blending. Fuller rotary feeders under these silos are driven through variable-speed reducers through which the blending is controlled. Screw conveyors collect this material and feed

One of pair of feeders proportioning raw materials to grinding mill.

it to a 10-in. Fuller-Kinyon pump which feeds it direct to two storage bins near the kilns. Blending is held consistently within 0.5 per cent. of the desired composition in spite of a variation of about 2 per cent. in the raw material fed to the blending system. The material is reclaimed from the storage bin by screw conveyors and is fed by elevators and screw conveyors into three kiln-feed bins.

The three 12-ft. by 233-ft. rotary kilns retained from the old plant have been improved by the installation of new

The primary crusher with typical inclosed drive. Dust collector hoppers are in background.

Car dumper of original design shown in use. Also shown is the pneumatic car retarder on the rail.

speed reducer drives. Coal for firing these kilns was formerly prepared in a separate building and was fed to the kilns by the bin system. Raw coal for these kilns is prepared by three No. 144 B & W direct-firing coal pulverizers.

Device which automatically records weight of raw material on conveyor to storage.

Coal is fed from storage to a belt-conveyor equipped with a Weightometer. The coal is discharged from this conveyor to a new 15-ft. belt conveyor, equipped with a magnetic pulley, which supplies the three circular steel pulverizer feed bins. Hot air for drying the coal and carrying it into the kilns is drawn from the primary clinker coolers. These pulverizers are operating very satisfactorily and a kiln capacity of 115 bbl. per kiln hr. is being obtained with a satisfactory fuel ratio.

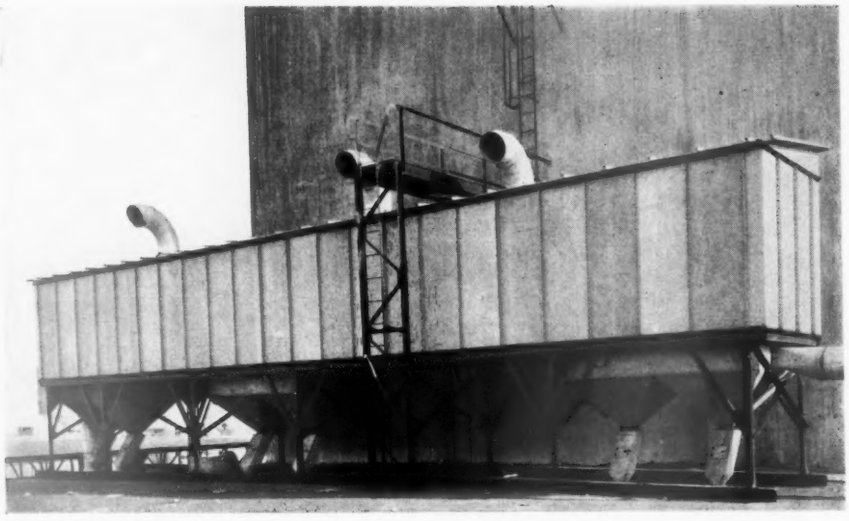
Clinker is discharged from these kilns into three 10-ft. by 78-ft. rotary coolers also retained from the old plant. The clinker is then fed to three 12-in. by 36-in. roll crushers before going into three 6½-ft. by 78 ft. secondary rotary coolers. Bucket elevators next feed the clinker on a belt conveyor. At this point the new flow again begins. A second belt-conveyor discharges the clinker into the storage building where it is distributed by the second overhead crane. The same system of cross distribution and longitudinal reclamation is followed as in the raw material storage section.

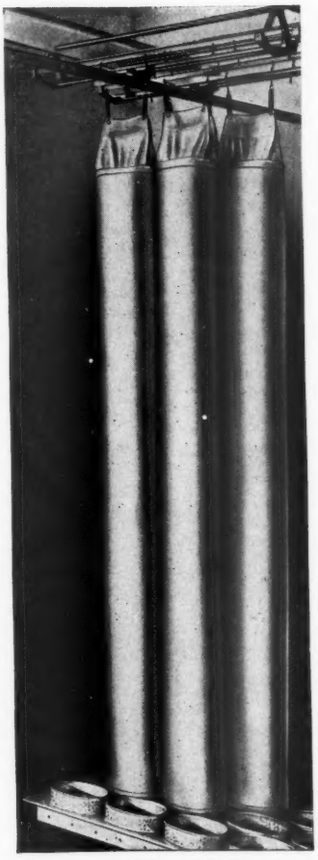
Gypsum is received in gondola cars and is unloaded by the same overhead crane into a 2,200-ton compartment in the clinker storage section.

The overhead crane feeds the clinker and gypsum into the two compartments

The 10-in. pneumatic conveyor pump which feeds product of raw mills into blending silos.

PARSONS solves DUST problems at LOW COST





Parsons Oval Bag Filtering Units with patented overhead rockers and suspension springs.

PARSONS Oval Bag Dust Arrestors

Highly Efficient . . . Economical to Operate

You will find Parsons Dust arrestors "just what the doctor ordered" for cement, sand, gravel, asphalt and lime plants. Parsons dust control systems are properly engineered to handle dust from screens, grinders, dryers, packers and miscellaneous pulverizing units.

The OVAL BAG design prevents swirling action and wear, as dust laden air enters the bags and will shake out moist materials with minimum fibre wear.

No metal shakers or wrappers contact the filtering cloth and the stickiest cake is discharged with ease when the bag unit is shaken.

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PARSONS PRODUCTS include Wet Collectors — the new Roto-Wash type, Rarefied and Multi Cyclones, Piping and Exhaust Systems, Tank and Bin Work together with the necessary Material Handling Systems.

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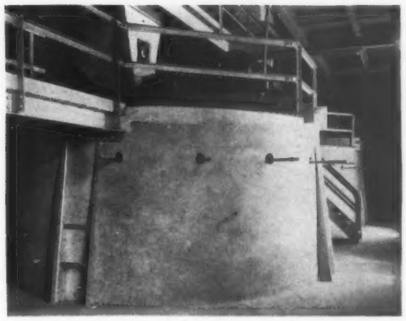
ot a bin in the finish-grinding department. A set of two 24-in. by 16-in. Feedoweights proportion gypsum and clinker to a bucket elevator feeding a 4-ft. by 10-ft. double-deck vibrating screen. The top deck merely protects the ⅜-in bottom screen cloth. The material over this screen is discharged

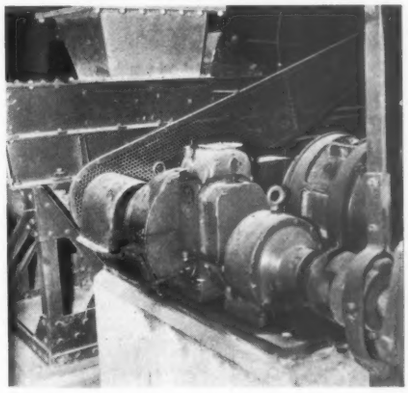


Two of the three 16-ft. insulated air separators in the raw-material-grinding department.

into a 10-in. high-speed gyratory crusher suspended by cables. The same elevator returns the crushed clinker to the screen, forming a closed circuit.

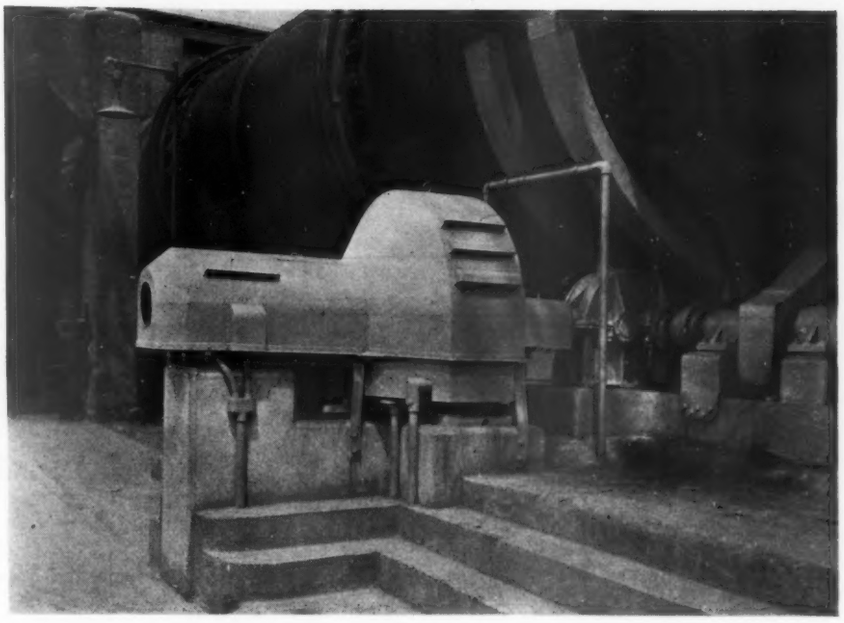
The clinker through the screen is carried by a No. 23 Redler conveyor to a series of two screw conveyors feeding the 10½-ft. by 12-ft. Preliminator grinding mill. The product of this mill is elevated and split to four 4-ft. by 10-ft. 1-deck mechanical vibrating screens with 20-mesh cloth. Oversize is returned to the screw conveyor feeding the mill. The material through these screens is carried by a series of two screw conveyors to the three finish-grinding mill feed tanks.

Fuller rotary feeders driven through variable-speed reducers discharge from these tanks into the first compartment



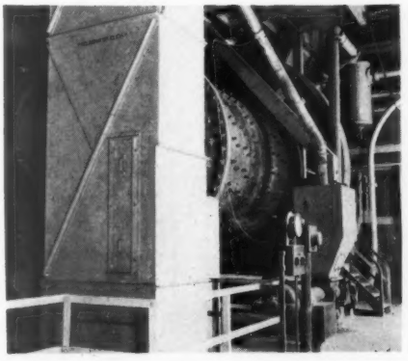
The variable-speed reducer drive of one of the dual proportioning feeders to raw mills.

of the three 8-ft. by 30-ft. No. 830 Ball Peb mills. Dust collected from the clinker crusher and the Preliminator are also fed here. The two compartments of these mills are separated by solid steel plates. The first compartment of each mill is loaded with 52,234 lb. of 1¼-in. steel balls and the second compartment with 52,780 lb. of ⅞-in. steel balls.



Inclosed speed-reducer drive of one of the three rotary kilns now in use.

The product of the first compartment is elevated to a screw conveyor feeding a 16-ft. air separator from which the



The preliminary finish mill with pneumatic conveyor system which conveys cement to storage silos.

rejects are returned by gravity to the first compartment. The fine material from this separator is fed by a screw conveyor to the second compartment of the mill. The product of this compartment is elevated to a screw conveyor feeding another 16-ft. separator. The rejects are returned to the screw conveyor feeding the second compartment and the fine product of this separator is finished cement. The finished cement has a temperature of about 200 deg. F. and can be packed immediately without difficulty. Each of the four mills in this department is driven by a 700-hp. synchronous motor in a separate room. Each mill circuit has the same flow sheet and is connected to a dust collector. The collected dust is fed into the elevator to the final separator.

The finished cement from the three final separators is discharged into a screw conveyor feeding an 8-in. Fuller-Kinyon Type H pump. The cement is pumped to two storage units each consisting of 12 silos and 6 interstices. These have capacities of 111,000 and 205,800 bbl., respectively. Packing for rail shipment only is done in a single building with four 4-tube Bates packers. There is also a bulk-loading arrangement for all types of container and bulk cars.

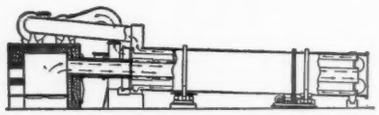
The facilities of making water shipments were improved in 1937. Special 300-bbl. transfer cars are loaded at the plant and are hauled by a 600-hp. Diesel-electric locomotive about 1½ mi. to an unloading shed near the bank of the Hudson River. Vibrators are used on the cars to insure complete discharge. Cement is fed by a screw conveyor and

(*Continued on Page 65*)

The three direct-firing coal mills which serve the existing kilns.

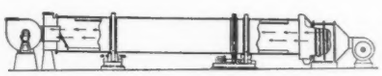
7 WAYS TO DRY YOUR MATERIAL

Without Contamination



White Clay, Talc, Kaolin, Chalk, Whiting, Pigments, Fuller's Earth, and other materials must usually be dried without contamination by furnace gases. Because of the high efficiency and high capacity per unit of cost of the Class "XB" Ruggles-Coles Indirect Heat Dryer when fired with coal, coke, oil, or gas, it is much preferred to the steam dryer. Protection from overheating results by reason of the contact of only the wettest material with the highest temperature of the inner shell. A balanced temperature of the product is assured, since the material progresses toward the lower temperature end as the moisture is reduced. It is a dustless dryer—even for finely divided materials. Control of air in gas chamber is independent of that in the moisture chamber.

Low Temperature

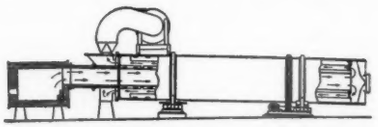


Hot air produced by air drawn through steam coils or other types of heaters is a safe method of drying at very low temperatures. Ammonium Sulphate and other salts and chemicals must be handled in this way. When necessary to prevent contamination, the shell is lined with stainless steel or other corrosive resistant metal. Use the Class "XW" Dryer.

High Temperature

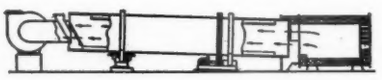
Chemical changes, Roasting, Burning, or Calcining are effectively produced on many materials in a brick-lined rotary kiln. Also where feldspar, flint, pigment, and the like must be dried without contact against a steel shell, but still can be dried by direct heat at ordinary temperatures, the Class "L" Dryer is used. The refractory lining holds the heat and prevents sticking of sludge or pigment.

Low Fuel Cost



The class "XA" Ruggles-Coles Dryer has the highest thermal efficiency of any rotary dryer. Savings in fuel alone pay for it in a few years. It is the safest dryer for drying coal and coke. Where high grade silica sand is dried in this type, protection is afforded the material from fuel contamination because the combustion of furance gases is practically complete by the time they travel through the long inner shell before contacting the material. Hundreds of them in use on sand, stone, clay, coal, coke, ores, concentrates, and many other materials.

Low Installed Cost

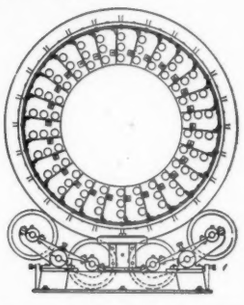


Frequently first cost is paramount. Where such low moisture materials as sand, stone, and ores are to be dried and no unusual restrictions on them is necessary, the Class "XF" counter-flow dryer is suitable. Furnished with roller bearings, temperature control, direct drives, etc., if desired.

Protection from High Temperature Gases

The Parallel Flow Dryer has the same general features of the Class "XF" Counter-Flow dryer. Materials that burn readily but contain 40 or 50% moisture and clays that are sticky, should be dried in this type of dryer. It is used only when one of the other types described is not suitable. The Class "H" dryer, also of this principle, has special features of design for concentrates that dust readily and are sticky.

Steam Tube Dryer



Fairly high moisture materials that are not sticky, such as corn germs, tobacco stems, cork, brewery and distillery slop and fibrous materials are dried in the Steam Tube dryer. Certain pigments may also be handled and non-corrosive metals can be provided for steam tubes, shell linings, etc. Refer to the Class "C" Dryer.

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Ruggles-Coles Dryers

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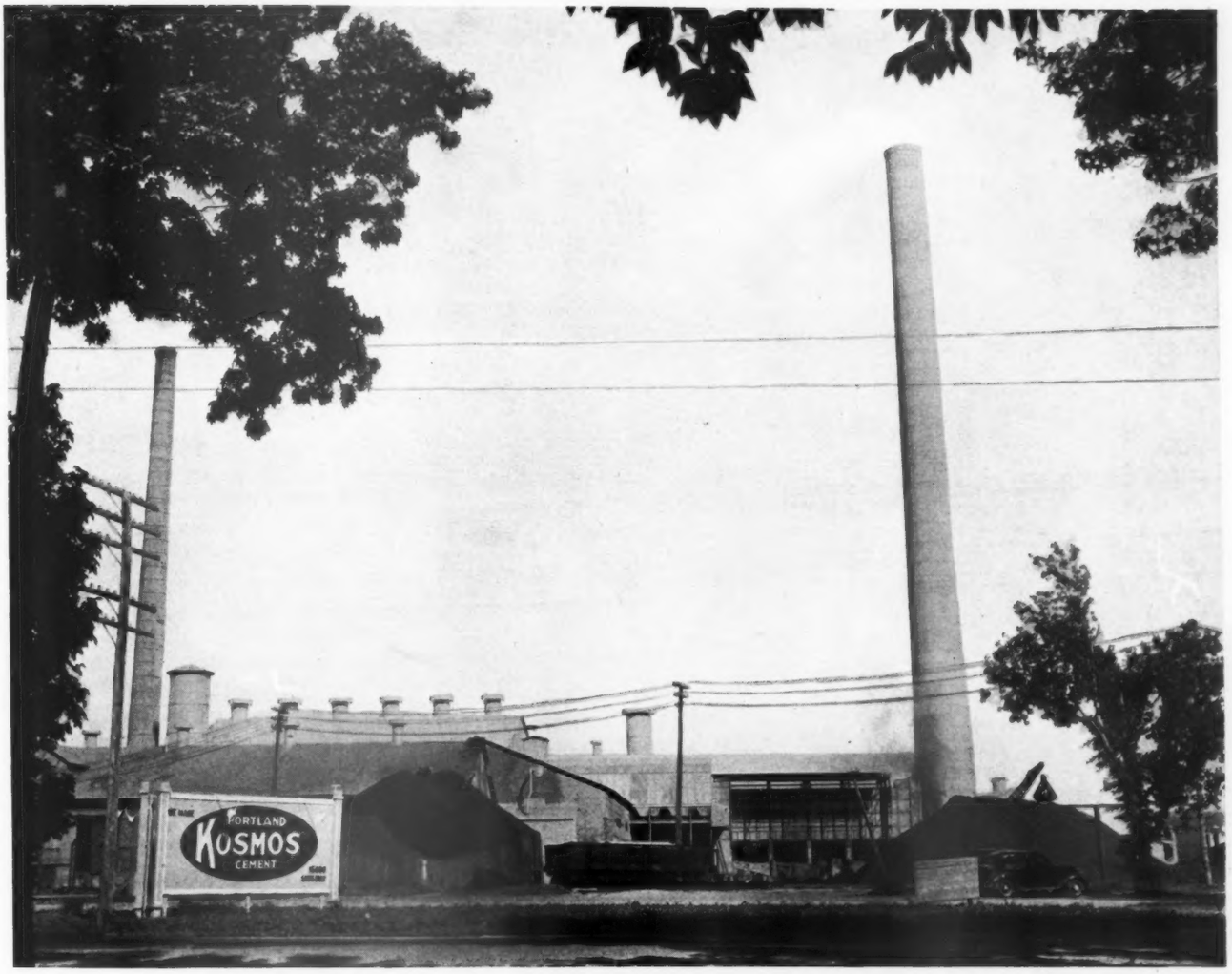
By W. E. TRAUFFER

Kosmos Installs Type of Direct-Firing Coal Mill New to Cement Industry



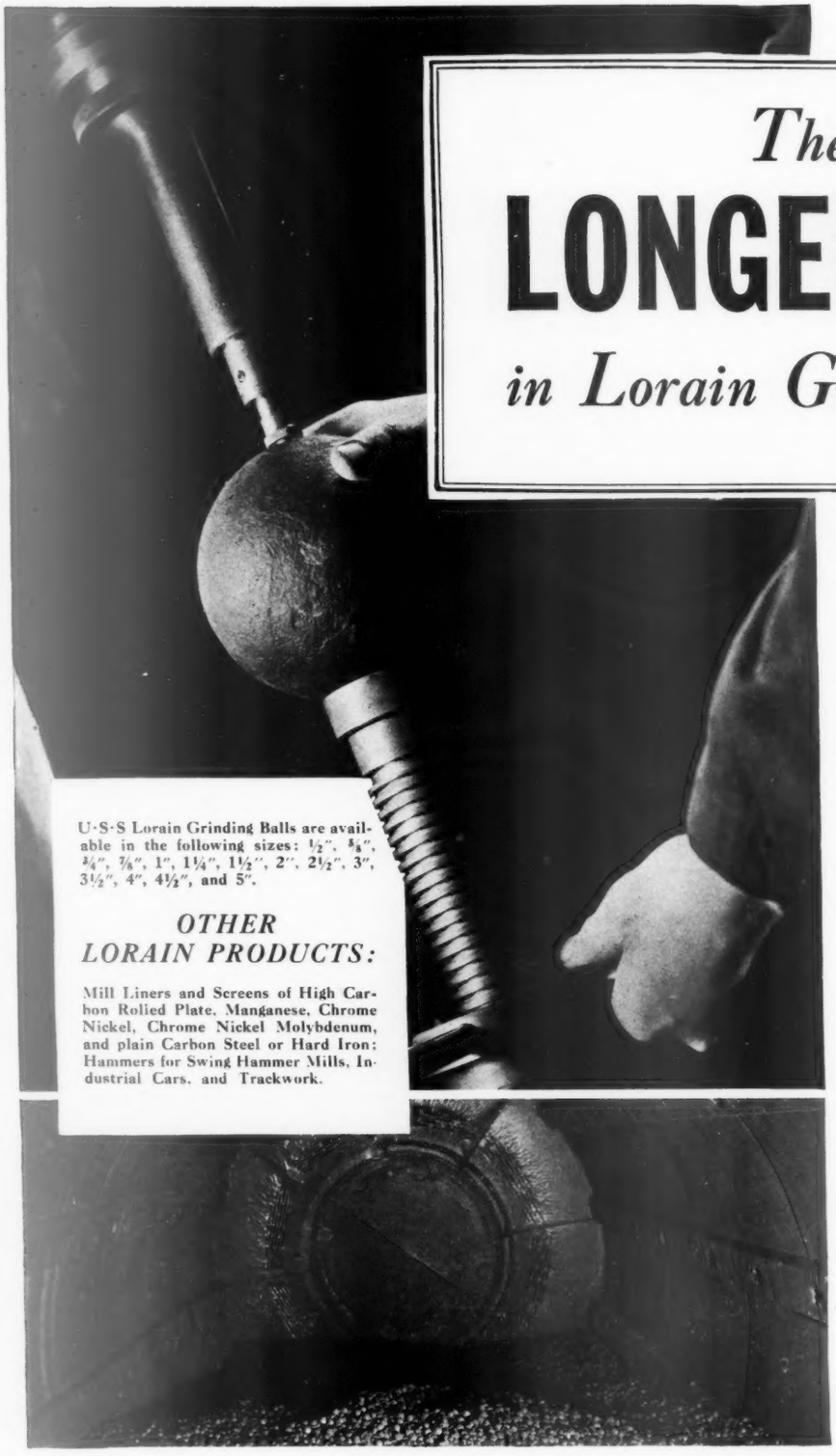
Part of the plant of the Kosmos Portland Cement Co. with dust-collecting chambers and new kiln stack at right. Old coal mill building is in left foreground.

IT was only a few years ago that the Kosmos Portland Cement Co. completed a series of improvements to its plant at Kosmosdale, Ky. These improvements were so interesting that an article describing them was published in the July, 1934, issue of PIT AND QUARRY. No sooner had this article appeared than the company began another improvement program which has just been completed. As few departments were left untouched, it is necessary to again describe the entire operation from quarry to packhouse in order to clearly illustrate the effect that these improvements have had on the efficiency of this plant.

A brief resumé of the improvements made since the last article was published follows. In 1935 a washing screen and a secondary crusher were installed in the quarry. In 1937 a secondary washing screen was added. These improvements were made to remove sand and magnesia and the resulting evenly-graded stone has made possible a better control of blending.

No changes of importance were made in the raw-material grinding and blending departments except for the installation of Redler conveyors as kiln feeders. In 1934 Manitowoc Engineering Co. Vanderwerp recuperators had been installed on the two 125-ft. kilns and these gave such good results that four 4-ft. short-plate type Vanderwerp recuperators were installed on the four 100-ft. kilns in 1937. During the 1937-38 winter shutdown the two larger recuperators were shortened from 8 ft. to 6 ft. and this change has further improved results and gives more effective kiln length. At the same time the kiln drives were rebuilt, thrust rollers were added to the small kilns and seal rings were installed on their front ends. A third tire was also installed on each of the two large kilns and the front tires moved away from the burning zone, which had been moved over them due to the installation of the recuperators. The kiln hoods were also rebuilt.

In 1937 also the four 5-ft. by 40-ft. rotary coolers and the 6-ft. by 80-ft.



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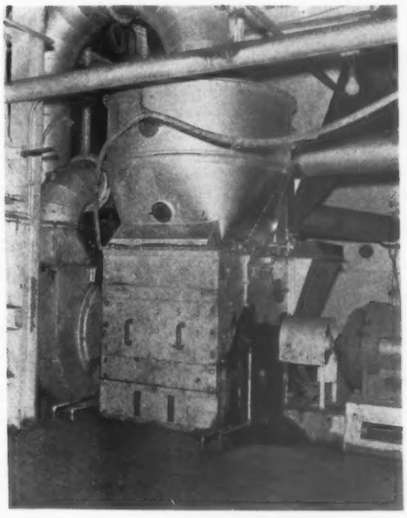
cooler were removed. A pan-conveyor was installed to feed clinker to a screen and dust collector operated in connection with the large rotary cooler which is now located alongside the clinker-storage building.

Earlier, a series of expansion chambers had been installed to carry the kiln gases to a large collecting chamber, to remove much of the dust before its release to atmosphere through a new kiln stack built by the John P. Boland Co. This company had, many years before, built the 205-ft. boiler stack.

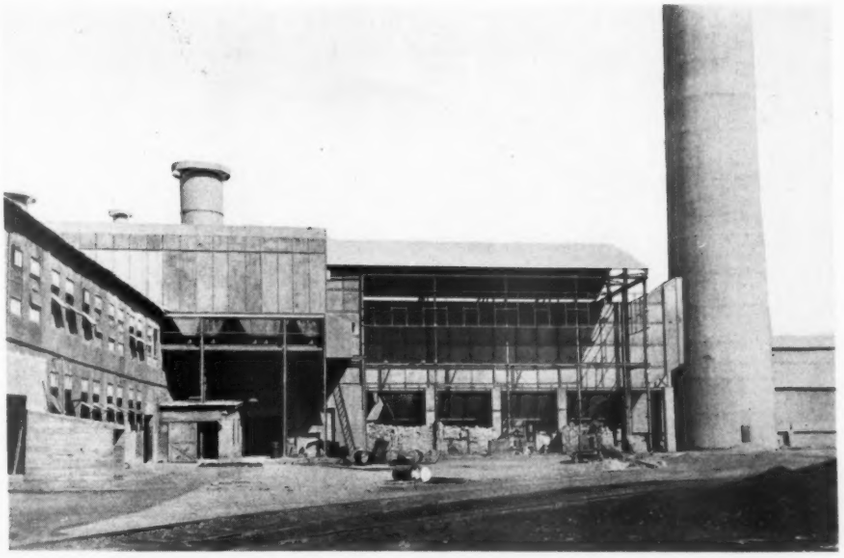
A Strong-Scott "Unipulvo" direct-fir-



One of the two mills firing the large kilns with burner pipe and kiln hood in right background.

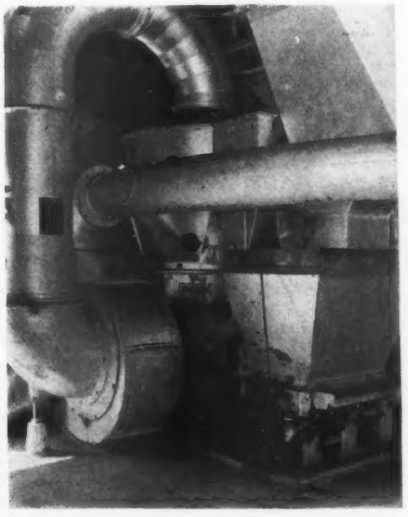
ing coal pulverizer was installed to fire one of the rotary kilns early in 1937. This machine was so satisfactory that ten additional "Unipulvo" mills were installed early in 1938. These now direct-fire the six rotary kilns, the auxiliary boiler and the three rotary driers, every point where such a machine could be applied in this plant.

The old coal-drying and grinding department has been abandoned but has not yet been dismantled. At the same time the unit coal pulverizers were installed a Williams hammermill was added for preliminary crushing of the mine-run coal. An American Air Filter Co. wet Rotoclone was connected to this equipment to keep the new coal department dustless. A new cement stockhouse was erected in 1935.



Another view showing the dust-collecting chambers and the base of the new 305-ft. kiln stack. The kiln building is at left.

All these latest improvements, as well as the previous ones, were made under the personal supervision of A. C. Brown, plant manager. They are part of a long-range program conceived by him to make this plant one of the most efficient and economical operations in the cement industry and, as the reader may judge from the evidence here presented, this program has been an unqualified success. While planning this program, Mr. Brown and Mr. Kraft, chief engineer, visited many cement plants in the United States and Canada and left no stone unturned in their search for information about the latest operating methods and equipment. Mr. Brown not only selected all of the new equipment but in many cases had it altered to meet his particular requirements. Some of the most important equipment was designed by the plant staff and built by the company forces. Some of the equipment installed is new to the cement industry as are some of the methods used but results have fully vindicated their judgment.



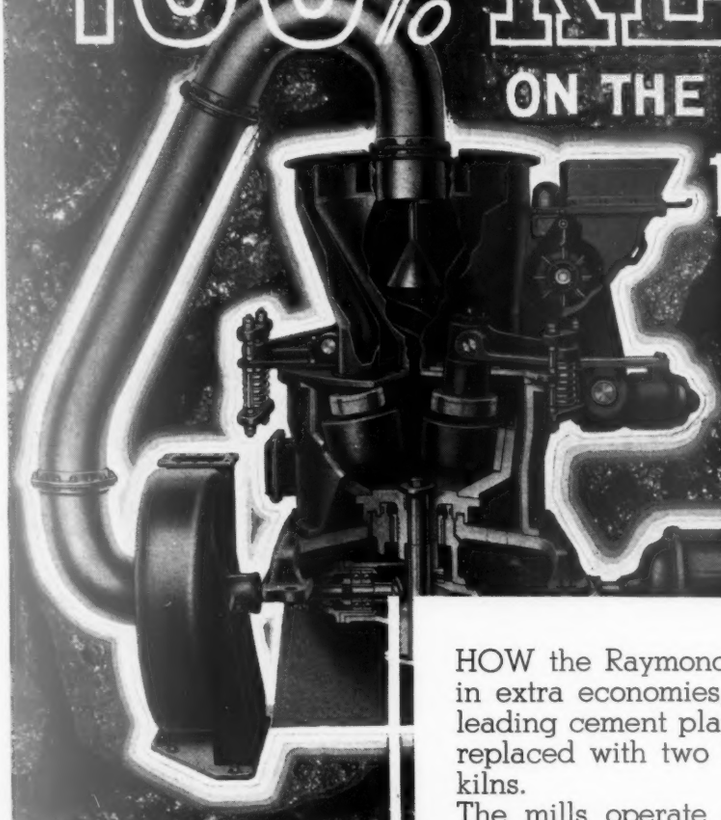
One of the direct-firing coal mills with bin and feeder in foreground and fan at left.

The limestone used in this plant is obtained from a quarry at Oolite, 30 mi. down the Ohio River and west of Kosmosdale. This quarry is located on the south bank of the river and there is enough stone in evidence to supply the plant's needs indefinitely. The limestone is overlaid with an average of 25 ft. of sandstone, part of which is removed by hydraulicking and the re-

Unloading limestone from barges on the Ohio river near the cement plant.

100% RETURN

ON THE INVESTMENT IN 16 MONTHS



HOW the Raymond BOWL MILL pays back its cost in extra economies, is shown by an installation in a leading cement plant where the bin system has been replaced with two Bowl Mills for direct-firing rotary kilns.

The mills operate on a 24-hour basis, drying and grinding the coal simultaneously and delivering a uniform mixture direct to the kiln firing hoods. Separate dryers are eliminated, and all other costs reduced.

Comparative results obtained over equal operating periods show the following advantages of Bowl Mill firing versus the former bin system:—

40% Reduction in power required per ton of coal handled from cars to kiln firing hoods.

7.5% Fuel saving in amount of coal used per barrel of cement produced.

91% Labor saving, exclusive of coal handling labor.

40.4% Decrease in maintenance and repairs.

44.3% Total saving in coal preparation costs.

These economies, figured in terms of dollars and cents, actually pay for the complete Bowl Mill installation in less than **sixteen operating months.** If you are planning to modernize your methods of kiln firing, investigate this "self-liquidating" equipment. Bulletin sent on request.

BOWL MILL

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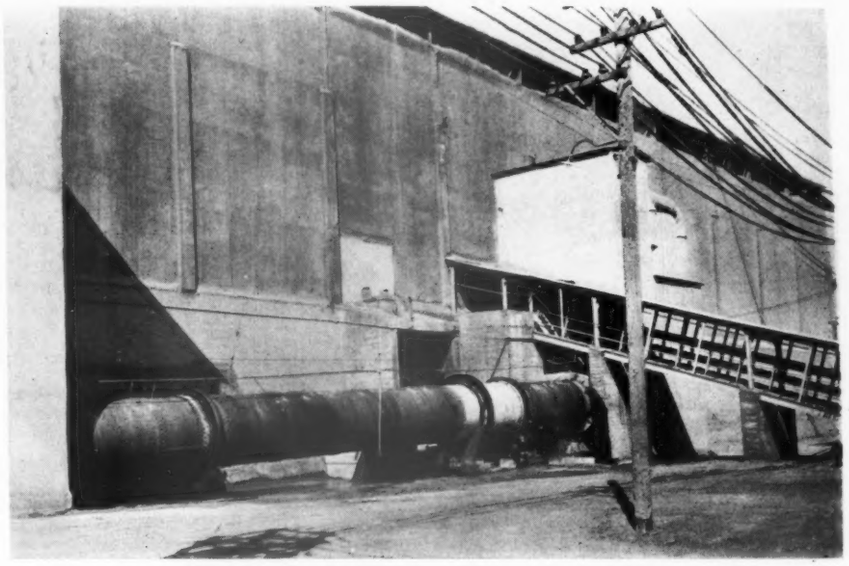
mainder by drilling and blasting. Well drills are used on the 150-ft. high limestone face which is shot down in the usual manner.

The stone is loaded by two 3-cu. yd. Bucyrus 70C railroad type steam shovels mounted on wheels into four Mack trucks equipped with 8-ton Easton Phoenix side-dump bodies. These trucks haul the stone about 2,000 ft. to the crushing plant where it is dumped over a bar grizzly into an Allis-Chalmers No. 12 Gates gyratory crusher. The product of the crusher is discharged on a 10-ft. plate feeder of company design serving a 4-ft. by 15-ft. Allis-Chalmers 2-deck vibrating screen. This has 2½-in. and ¾-in. openings and both decks are equipped with sprays. The oversize is discharged to a Telsmith reduction crusher which reduces to 2½-in. and under. The product of this crusher and the material off the bottom deck of the screen combine on a belt conveyor which feeds other conveyors to a storage pile of 5,000 ton capacity, or for direct barge loading.

The stone through the bottom deck of the screen is discharged on a 4-ft. by 12-ft. Allis-Chalmers 1-deck Low Head screen. This has ⅛-in. openings and is equipped with sprays. Fine material through this screen flows into a settling basin from which it is hauled to waste at intervals. The water overflowing this basin goes into the river. The material retained on this screen is discharged to the same series of conveyors already described. Stock-piled stone is reclaimed on a tunnel belt-conveyor for loading to barges. Steel barges of 750-ton capacity are used in this service and these are towed upstream to the plant by twin-screw tow-boats. These are owned by a subsidiary, the Kosmos Towing Co. which operates seven tow-boats on the Ohio River. The barges are tied up at an unloading station near the cement plant where a stiff-leg derrick with a 3-cu. yd. clam-shell bucket transfers the stone from the barges into a hopper. Mead-Morrison cable cars haul the stone a distance of ¼ mi. to a 10,000-ton storage pile at the plant.

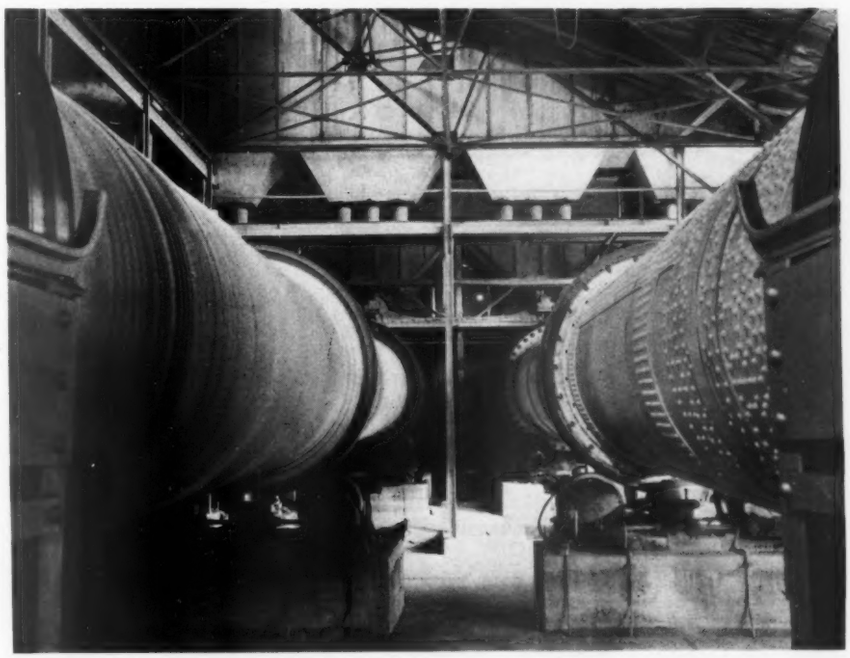


The new clinker-cooling arrangement. Pan conveyor feeds to screen over the spray-cooled rotary cooler. Cyclone dust collector is at right.

Clay is obtained from a pit about 1 mi. from the plant. A steam shovel loads it into four White trucks which haul it to stockpiles at the plant. These trucks have 7½-ton end-dump bodies.

Stone is reclaimed from storage by two tunnel conveyors. Clay is fed by hand to a third tunnel-conveyor. Each of these three conveyors feeds a 6-ft. by 80-ft. rotary drier. Each of the three driers has been equipped with a Strong-Scott "Unipulvo" direct-firing coal mill. A No. 30 Type F. Rotoclone was installed on one of the stone driers over two years ago acting as a draft fan and dust collector. According to Mr. Brown, no repairs have been necessary to this unit. A description of this installation was published in the July 1936 issue of PIT AND QUARRY. The dried stone is discharged into a Williams hammermill for reduction and is stored in six 50-ton bins. The dried clay is stored in two bins of the same size.

Dried clay is reclaimed from storage by two Hardinge constant-weight feeders and stone by six table feeders, all of which are operated at one time to give more uniformity. These discharge on a belt-conveyor feeding a Bradley Hercules mill which is used for preliminary raw grinding. The product of this mill is stored in eight 440-ton bins where it is sampled and corrected as it enters. Rotary feeders under these bins discharge the Bradley mill product into a screw conveyor followed by an elevator to a feed bin over the Allis-Chalmers 8-ft. by 35-ft. tube mill. This mill is in closed circuit with two 16-ft. Sturtevant air separators from which the rejects are returned to the tube-mill feed. This department now grinds enough raw material for a production of 3,600 bbl. daily to a fineness of 90 per cent. through 200 mesh. When making high-early-strength cement, the raw material is ground to 95 per cent. through 200 mesh.



View between the two 125-ft. kilns showing part of the dust-settling chamber with hoppers and collecting screw conveyor below.

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with the

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THE Roto-Clone combines the work of a dust separator and exhauster in a single, compact unit performing both functions with greater efficiency and saving of space, piping and power. Available in three distinct types and a wide range of sizes.

Type F Roto-Clone is recommended for conditions where the dust must be collected dry. Applicable to stack gases for the elimination of cinders and fly ash, rotary dryers and coolers, kilns, coal cleaning and similar operations.

Type W Roto-Clone combines the water spray with dynamic precipitation for handling dusts inclined to cake or pack. Collected material is delivered in the form of sludge or slurry. Successfully applied in the Cement industry to coal pulverizers and raw material processing.

Type D Roto-Clone is recommended for crushers, pulverizers, elevators and belt transfer points; in processing, conveying and mixing materials in granular or powdered form.

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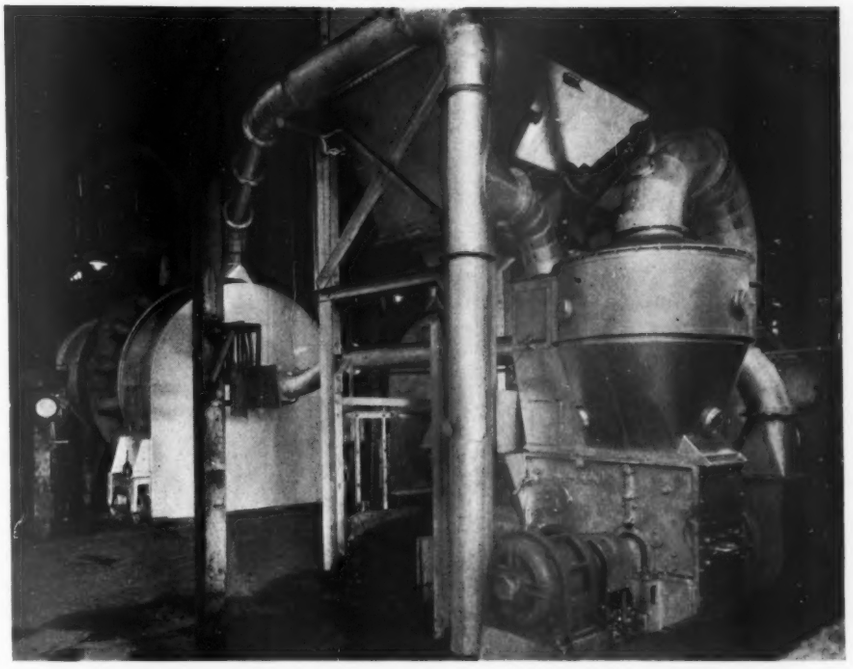
FOR COMPLETE DUST CONTROL

The fine raw material from the separators is transported by an 8-in. Fuller-Kinyon pump which is part of a Fuller-Kinyon dry raw-material blending system. The pump feeds alternately to the four compartments of a steel blending tank with a total capacity of 10,000 bbl. Another 8-in. Fuller-Kinyon pump under these compartments draws from the bottom and returns the material into these compartments for further blending. A third pump of the same size feeds the finally-blended material into the kiln-feed bins. The automatic control board operating the blending system can be adjusted to any desired time interval but is usually set at some point between 2 and 15 min. depending on the character of the raw material.

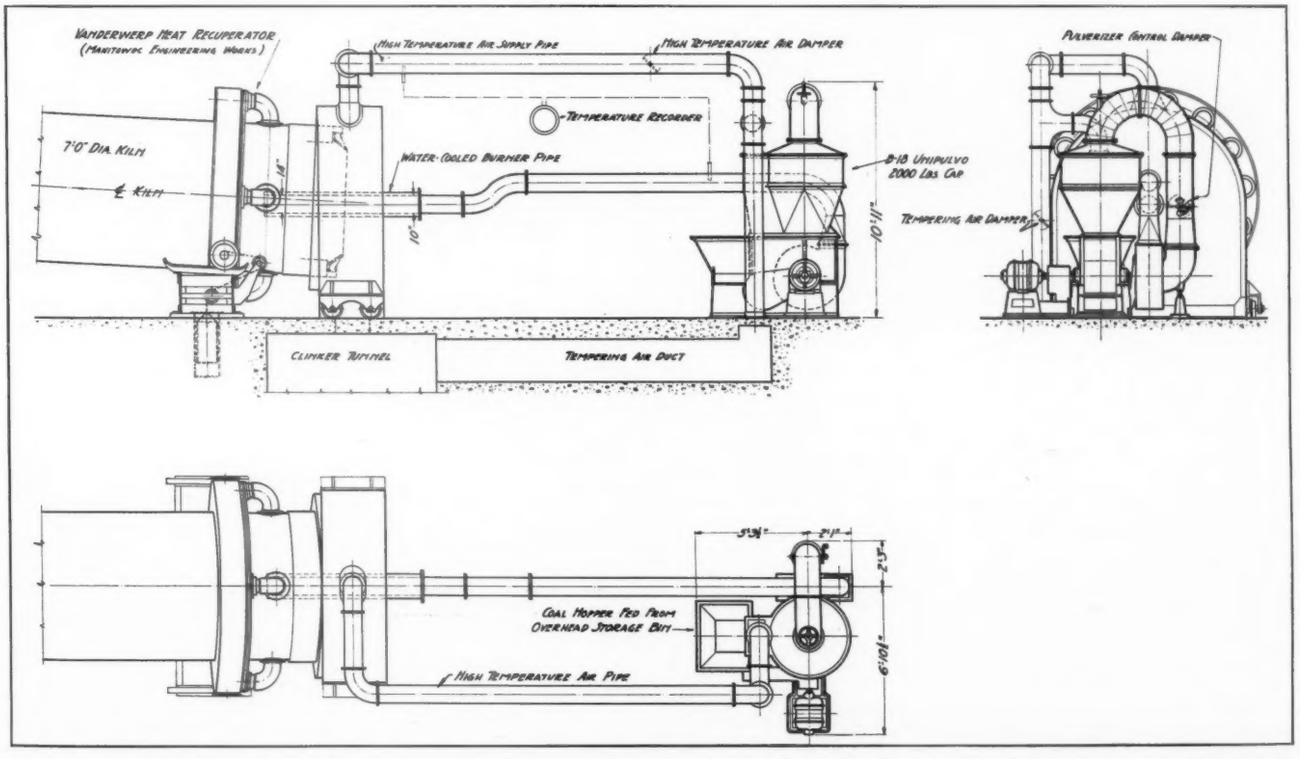
The six rotary kilns are fed from three 30-ton feed tanks, each double-hoppered to feed two kilns. Two Stephens-Adamson 9-in. Redler conveyors feed the two 8½-ft. by 125-ft. kilns and four 5-in. Redler conveyors feed the four 7-ft. and 6-ft. by 100-ft. kilns. These conveyor-feeders run horizontally under the bins and are then inclined at 60 deg. to discharge into the kiln feed pipes. The uniform rate of feed obtained with these conveyors has helped to improve the quality of the clinker and increase the burning capacity of the kilns, according to Mr. Brown.

In the earlier article the results obtained from the installation of the two 8-ft. Vanderwerp recuperators were given in detail. Clinker was cooled to 750 to 899 deg. F. and the preheat of the kiln combustion air was estimated at about 1,000 deg. F. The exit gas temperatures ranged from 1,400 to 1,600 deg. F., about 200 deg. higher than formerly, increasing the capacity of the waste heat boilers considerably. According to Mr. Brown shortening these recuperators to 6-ft. has made them even more efficient. Similar results are being obtained with the short-plate recuperators installed on the four small kilns.

Coal is brought in on barges and is unloaded by the same derrick used for



A coal mill firing one of the four 100-ft. kilns. Shown also are the kiln-burner pipe, hot-air pipe from kiln hood, and recuperator.

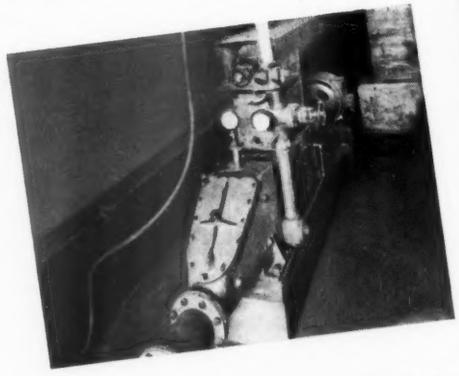


Plan and elevation drawings showing the close relationship between the operation of the coal mills, the kiln, and the recuperator. This installation is on one of the 100-ft. kilns.

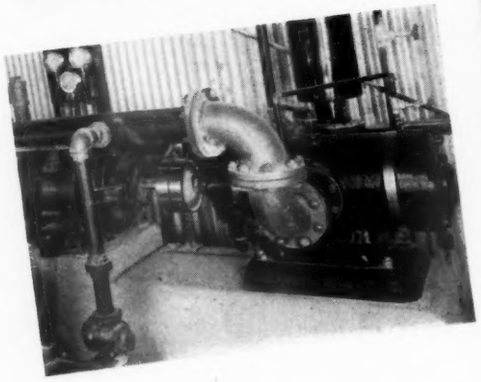
New *Puerto Rico* Cement Plant uses Fuller-Kinyon System and Fuller Rotary Compressors

Fuller-Kinyon Conveying Systems for many years have been considered standard equipment in the cement industry. Therefore, it was only natural that the engineers in charge of design and construction for the new Government cement plant in Puerto Rico should select this method of conveying.

Six inch, Type H, Fuller-Kinyon Pumps are employed for conveying finished cement from pulverizers to storage silos, a distance of 300 feet. These pumps are of the latest design, using low-pressure air. Pumps installed in the Puerto Rico plant are of the type illustrated in photo at right.



In the new Puerto Rico plant, all the air is supplied by Fuller Rotary Compressors. Two single-stage compressors, of the type illustrated at right, furnish air for the Fuller-Kinyon Pumps and slurry agitation. One two-stage compressor, 100 lb. pressure, is employed for quarry operation and general plant service.



Fuller Rotary Air Compressors are rapidly being installed in many cement plants. Due to their inherent characteristics and construction original capacities are maintained for the life of the machine at a minimum cost for repairs or replacements.

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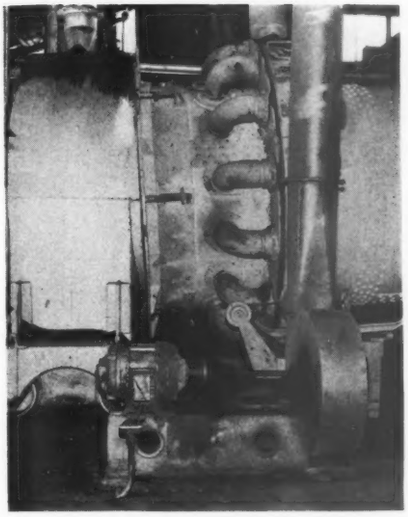
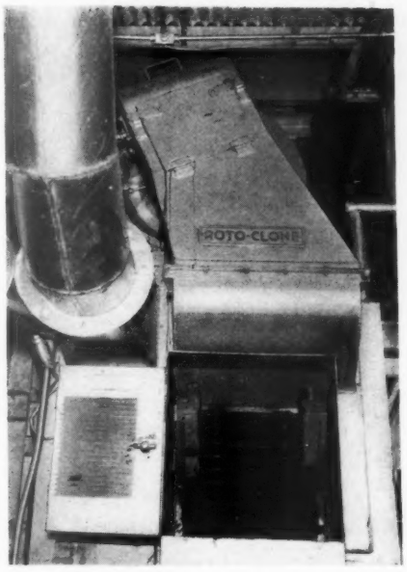
stone. It is also handled by the same cars into a bin from which trucks haul it to a storage pile. Some coal is also brought in by rail. A crane rehandles the coal to a hopper from which a belt conveyor feeds a Williams No. 2BC coal hammer-mill. A bucket elevator feeds the crushed coal to a screw conveyor, from which it is discharged into



The short-plate recuperator and fan on one of the 125-ft. kilns.

the six coal mill feed bins. Screw conveyors also feed coal to the bins over the mills serving the driers and auxiliary boiler. An American Air Filter Co. 10-in. wet "Rotoclone" is connected to the pulverizer and the elevator and keeps the firing floor practically dustless. This machine is over 99 per cent. efficient. The collected dust, containing



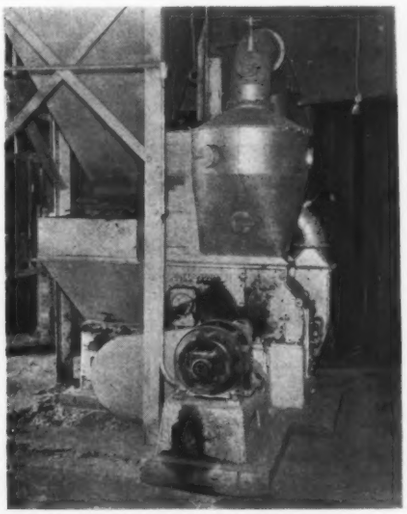
The combination fan and wet dust collector showing dust being returned to circuit.

about 40 per cent. moisture, is discharged on the belt conveyor feeding the pulverizer and, mixed in this manner with the dry coal, does not affect the efficiency of the pulverizing equipment. The Rotoclone draws hot air through the elevator and pulverizer from the clinker pan conveyor under the kiln floor.

The firing of all equipment in the plant is now done by individual Strong-Scott "Unipulvo" direct-firing coal pulverizers. The two 125-ft. kilns are each connected to Size C40 mills driven by 60-hp. motors. The four 100-ft. kilns are connected to Size B18 mills driven by 30-hp. motors. An auxiliary boiler on the kiln floor is fired by two Size B18 mills. Two mills are used because of the widely-varying steam load. The three clay and stone driers are fired by Size B8 mills driven by 15-hp. motors.

A Brown double-recording thermometer for each mill records the temperature of the air entering each mill and leaving each mill. These temperatures are maintained consistently at 600 to 700 deg. F. and 200 to 220 deg. respectively.

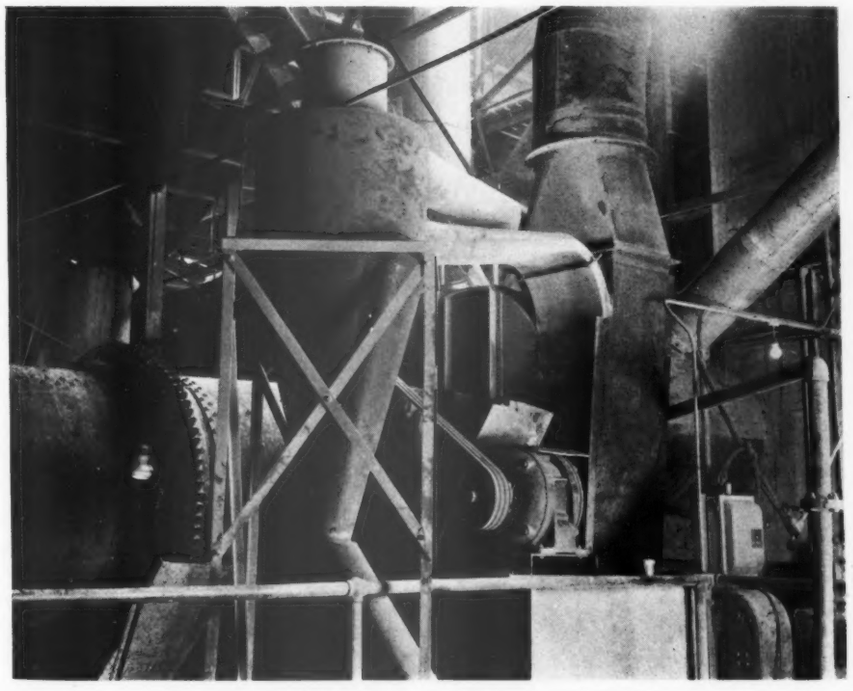
Excellent results are being obtained with these mills in all three types of application. They are grinding a 13,000 B.t.u. coal with an 8½ to 9 per cent. ash content to a fineness of 90 per cent. through 100 mesh and 60 per cent. through 200 mesh with nothing retained on the 50 mesh. A number of tests made by the mill staff show that the large C40 mills are grinding 4,000 lb. per hr., the B18 mills 1800 lb. per hr. and the B8 mills 800 lb. per hr. The output of these mills and the fineness of their product are not affected by changes in the moisture content of the raw coal and, because of the uniform delivery of pulverized fuel to the kilns, there is no flame pulsation. They also eliminate the flooding common to the bin system formerly used, and the



One of the three mills which fire the clay and limestone driers.

result is a better and more evenly-burned clinker containing less than .4 per cent. free lime. These mills have been credited with a coal saving of about 10 per cent. on a B.t.u. basis and have also appreciably increased kiln capacity. Power consumption of these mills is about 15 kw. per ton of coal ground and it appears that maintenance costs will average about 4c per ton.

Each of the six kilns is connected to a Wickes waste-heat boiler equipped with a Greene fuel-economizer and a superheater. Individual draft fans draw the gases from the economizers into a



The dust-precipitating unit which also serves as a draft fan connected to one of the rotary stone driers in this plant.

How to MODERNIZE

YOUR DUST ARRESTING EQUIPMENT ... AT SMALL COST

View shows an old dust arrester case rebuilt with new Sly cloth bag filter parts. Sufficient space was available to place the bags in rows three tiers high. Each bag has 22 square feet of cloth and is held under proper tension by springs.

●You can modernize your old dust collector by installing new Sly flat cloth bag filter parts . . . at a cost only a little higher than rebuilding your equipment with original parts and at a much lower cost than new equipment. The Sly cloth filter was designed with this purpose in view.

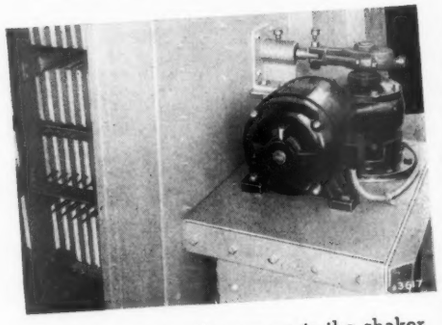
If you are expanding operations you can have additional filtering capacity with such change over. In rebuilding we can always exceed present filtering capacity for handling more air, or reducing the ratio of air to cloth and lowering the resistance to the flow of air, without using all of the present case. The balance of the case is converted into a classifier or settling chamber.

By connecting the dust pipe or pipes to this classifier section much of the heavy *abrasive* material entering the filter will be deposited in this section, allowing only the finest dust to reach the cloth bags.

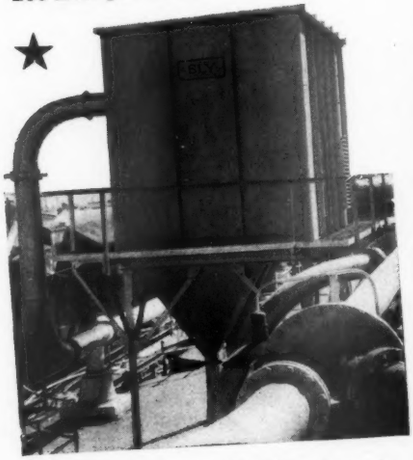
You also save on operating cost by rebuilding because the new shaker mechanism thoroughly cleans the bags thereby keeping the static resistance of the filter to a minimum which reduces the power required at the exhaust fans.

In these times when every cost is put under a magnifying glass, scores of plants are finding a Sly change over means a better and even larger dust collecting system without buying all new equipment.

A few minutes to investigate this plan will easily mean substantial savings for you. Your inquiry will receive prompt attention.



When we furnish new parts the shaker device mechanism includes a gear head motor with base, support and housing (not shown). The shaker mechanism is designed to flex, beat and shake each bag over 200 times per minute.



Cut shows a new Sly filter for collecting dust created by filling cement silos. With Sly parts you can make your old dust arrester equally modern.

THE W. W. SLY MANUFACTURING CO.

Blast Cleaning Equipment, Tumbling Mills Dust Control Equipment for Every Industrial Purpose

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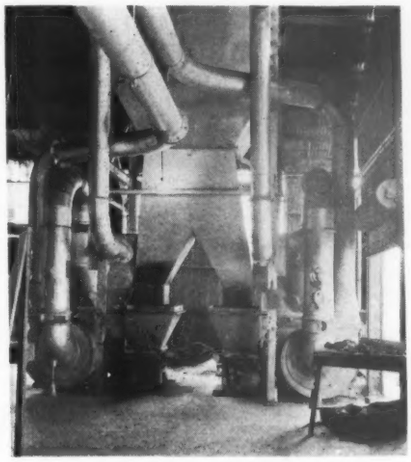
common duct leading into two large precipitating chambers. The driers are also connected to this duct. The gas velocity is dropped to one-third of normal in these chambers and as a result much of the coarsest dust is precipitated. The dust entering this duct is about 6 per cent. of the material fed to the kilns and driers and 40 per cent. of this is precipitated into the hoppered bottom of the ducts and collecting chambers. About 24 tons of dust are being reclaimed daily. The fine dust and gases pass to the 300-ft. reinforced-concrete kiln stack which has an inside

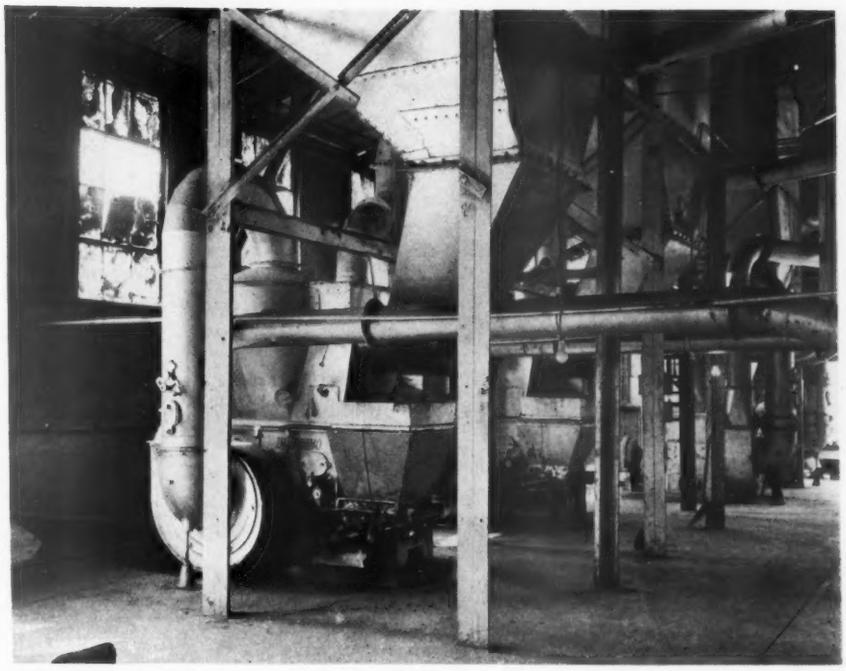


The dual direct-firing system for the auxiliary boiler which supplements the waste-heat boilers.

diameter of 23 ft. at the bottom and 15 ft. at the top. This stack was built by the John P. Boland Co. The ducts and precipitating chambers were designed by the plant staff and built by the company forces and they are of all-welded steel plate construction. The duct leads to a 40-ft. by 15-ft. chamber 50 ft. long followed by a 30-ft. by 9-ft. chamber 50 ft. long. Screw conveyors collect the precipitated dust from the duct and chamber hoppers and from the stack base and discharge it into the raw material flow to the tube mills. According to tests the coarse collected dust contains no harmful ingredients and the fine dust containing alkalis, etc., goes out the stack.

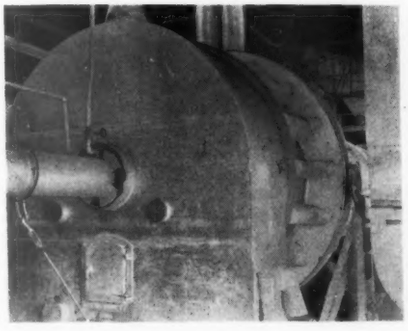
Intensive experimentation with various methods of kiln control have resulted in the adoption of a method differing considerably from those in use in most other plants. It is found that best burning results are obtained by holding the kiln feeder and kiln speeds constant and varying only the rate of coal feed to the kilns which are driven by constant-speed motors. With this method it is only necessary to know how long the kiln feeder has run in order to determine the output. Westinghouse total-hour meters on the kiln-feeder motors record the operating time.

Kosmos aims to burn hard clinker



A view of the kiln firing floor with two of the mills firing 100-ft. kilns in foreground. In background is the dual auxiliary boiler firing system.

without forcing the kiln and the kilns are operated on a draft of only .2 in. The kilns are operated with 5 per cent. excess air. Of the total air 40 per cent. is used in drying and grinding the coal in the pulverizers and the balance enters the kilns through the recuperators. While fuel rates as low as 75 lb. per bbl. have been obtained by using coal with a high B.t.u. value it has been found that bests results are obtained with a 13,000 B.t.u. coal containing 8½



New kiln hood and shortened recuperators on one of the two 125-ft. kilns.

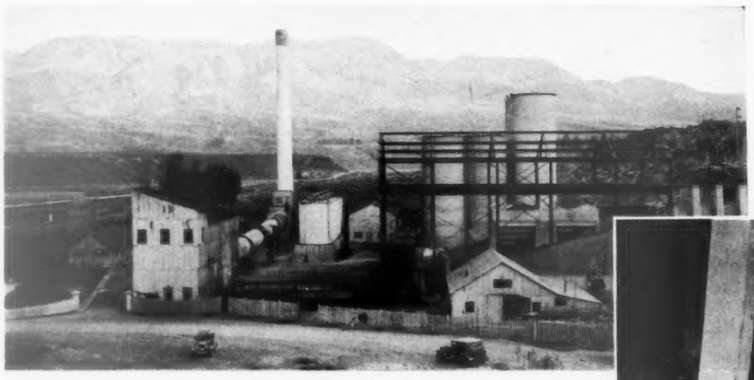
to 9 per cent. ash. With this coal a fuel rate of 90 lb. per bbl. is obtained with a production of 3,600 bbl. daily. While hard burning of the clinker keeps the fuel consumption higher than it would otherwise be Mr. Brown believes that the higher grindability of the clinker and the better quality of the resulting cement outweigh this consideration. Hard-burning also reduces the expansion on the Autoclave test. Some credit for the increase in efficiency of the plant is due to the fact that delays due to repairs to equipment have been almost entirely eliminated by installing new equipment and modernizing the old equipment.

Operating now under almost ideal conditions the waste-heat boilers and power plant are generating about 23 kw. per bbl. of cement produced which is all that would be required to finish the clinker output of the kilns. It must be remembered, however, that cement is being ground much finer than required by specifications. Mr. Brown estimates that only 17 kw. per bbl. would be used if the cement were ground just fine enough to pass specifications.

Clinker is discharged from the kilns on a 30-in. by 220-ft. Union Chain Co. pan conveyor which is horizontal under the kilns and is inclined outside the

Coal-preparation unit with collector above. Return of wet dust to conveyor is shown.

LOW COST CRUSHING FOR 53 YEARS



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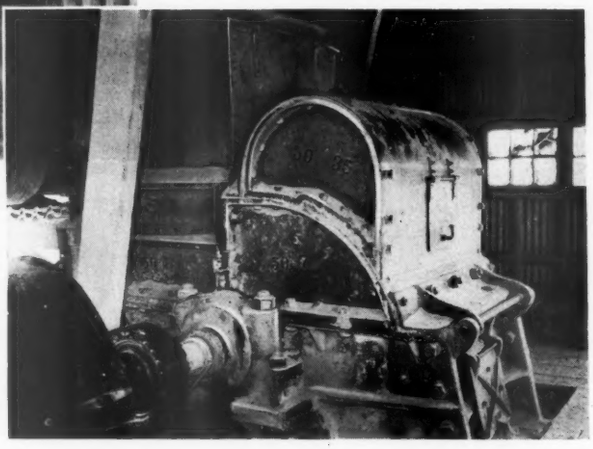

Now Greater Output in less time with present Primary and Secondary Crushing Plant

At Idaho, the raw material after primary crushing is conveyed to the large 6 X B GRUENDLER HAMMER CRUSHER for secondary crushing, the product properly finished is discharged then in the 800 ton Capacity Bins.
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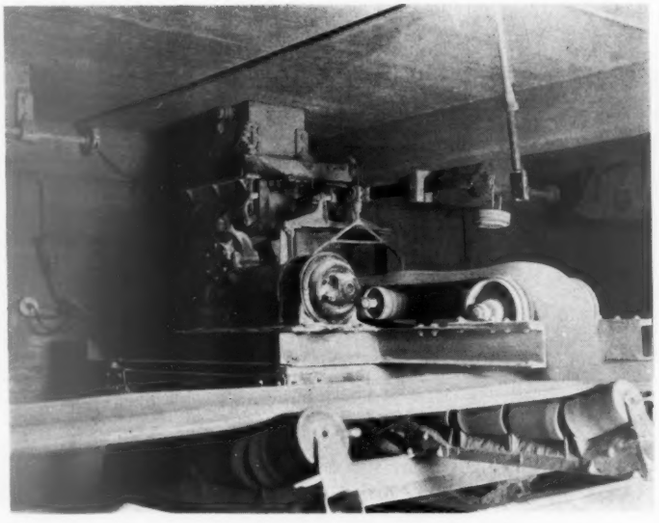
"The Weigh-Mix-Master"



Four movable Schaffer Poidometers installed under the 100-ton bins accurately blend the mixture at the Powell Spur plant of Spokane Portland Cement Company.

Three also installed at new Puerto Rico Cement plant.

Wherever there is a modern cement plant operating at top efficiency, you'll find Schaffer Poidometers on the job, taking full responsibility for the accurate weighing and proportioning of the mix.

Schaffer Poidometers are automatic in action and will operate continuously or, with a mechanical weighmaster attachment, they will provide for batch operation. They are saving thousands of dollars in scores of leading plants by solving difficult proportioning and feeding problems.

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SCHAFFER POIDOMETER CO.
2828 Smallman St. Pittsburgh, Pa.

kiln building. The clinker is discharged from this conveyor on a 3-ft. by 8-ft. Allis-Chalmers 1-deck Low Head screen equipped with ½-in. perforated plate. The clinker through this screen goes to a bucket elevator which discharges it into the clinker storage building. The clinker retained on the screen is discharged into the 6-ft. by 80-ft. rotary cooler. The cooled clinker is discharged into storage by another bucket elevator.

The mill used for preliminary grinding of the limestone and clay.

The cooler is under forced draft from a 20,000-c.f.m. Norblo fan pulling through a 12-ft. dia. Norblo cyclone-type dust collector. This collector has two inner rings dividing it into two annular spaces and an inner circular chamber. The dust is settled out in the outer chamber and the air is released upward through the center chamber. The intermediate chamber prevents interference of the counter air currents. This clinker cooling system easily does the work of the five former rotary coolers and has a capacity of 160 bbl. per hr. The pan conveyor has been carrying 800-deg. F. clinker for 15 months and has not required any maintenance or been shut down.

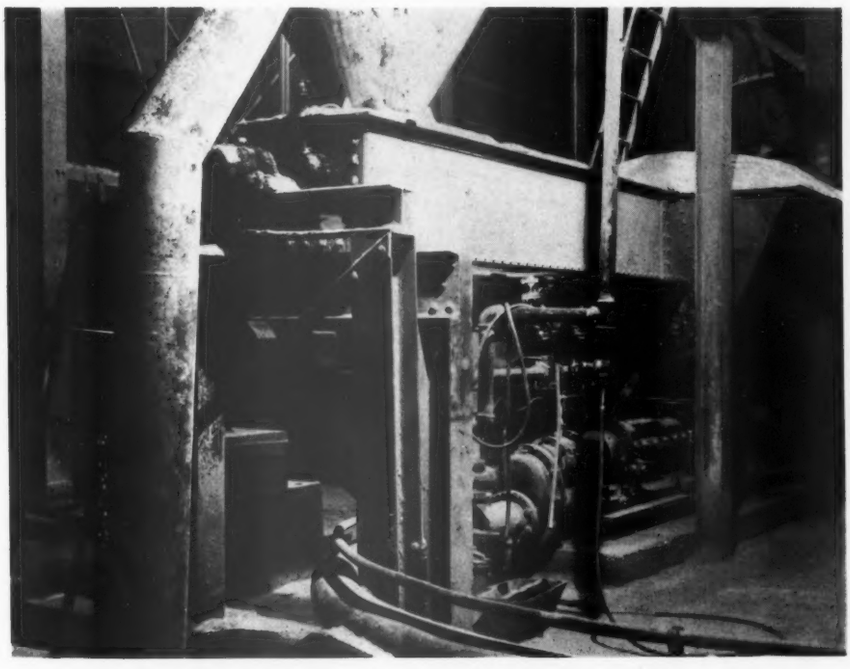
The clinker-storage building is 80 ft. wide and 275 ft. long and has a capacity of 150,000 bbl. A 20-ton P & H overhead electric crane with a 3-cu. yd. Williams clamshell bucket distributes clinker and gypsum in the storage and reclaims them into two bins. Two Hardinge constant-weight feeders proportion clinker and gypsum from these bins to a bucket elevator feeding a bin over the Bradley preliminary-grinding Hercules mill. The Hercules mill is equipped with an 8-mesh screen and grinds 200 bbl. of clinker per hr. An elevator and a screw conveyor feed the mill product into an 8-ft. by 35-ft. Allis Chalmers 2-compartment mill which can be operated in open- or closed-circuit as desired with two 16-ft. Sturtevant separators. In this department also are six 6-ft. by 22-ft. tube mills which are fed from the Hercules mill and operate in open circuit.

This department has a capacity of 5,000 bbl. daily of standard Portland cement which is ground to a specific surface of 2,000 sq. cm. per gm. High-early-strength cement is ground to 2,800 surface area.

When making Kosmortar two other 6-ft. by 22-ft. tube mills in the finish-grinding department are used. Redler conveyors will be installed to feed these mills and their product will be stored in a 5,000-bbl. steel silo which was formerly used at the river loading dock. A separate 3-spout Bates packer is used for their product.

Another view of clinker cooling system with cyclone dust collector and cooler draft fan.

The product of the finish-grinding mills is carried by screw conveyors and elevators to the old 150,000-bbl. cement stockhouse. Cement is reclaimed from this building by screw conveyors and is discharged by elevators into bins in the packhouse feeding the four 4-tube Bates packers. The new stockhouse has a capacity of 100,000 bbl. and is filled with cement by means of a Fuller-Kinyon Type C remote-controlled portable unloader. This unloader is connected to the flow from the finish mill when storing cement. It is also used for reclaiming the cement in the stockhouse and feeding it to the packhouse. This stockhouse is not divided into compartments and is used as excess storage space. It is filled during the dull winter season and drawn upon when the



The pneumatic conveying system which feeds pulverized raw material to the automatic blending system.

The pan-conveyor to screen which feeds only coarse clinker to cooler.

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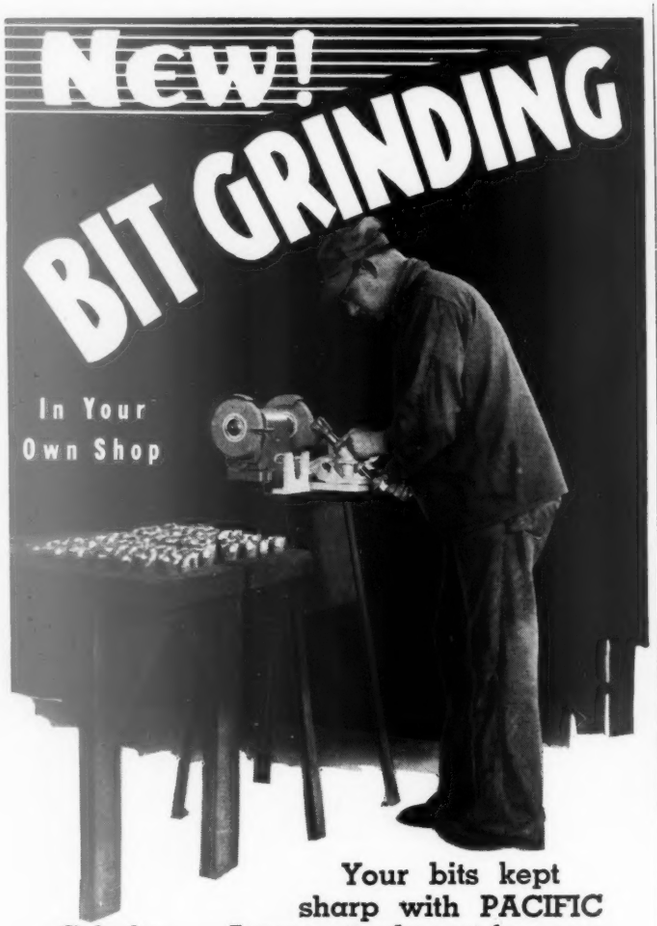

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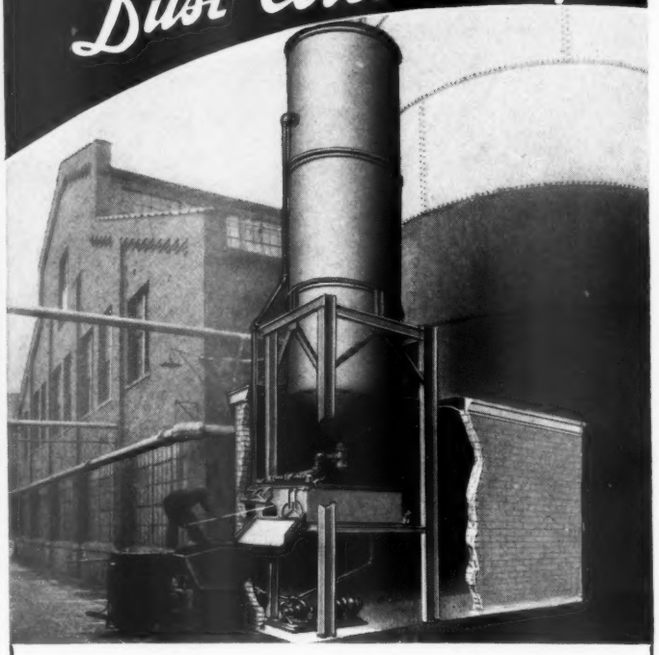
CEMENT MILLS SAVE WITH *Schneible Multi-Wash Dust Collectors!*



Removing accumulated sludge from the Multi-Louver Dewatering Tank of a Schneible Multi-Wash System installed in an Ohio plant.

—because they employ no bags, screens or filters to wear from abrasive particles; they do not store dry collected material; they have nothing to break, burn, clean or replace; no nozzles, spray heads or moving parts; no complicated electrical devices.

They are unaffected by heat, cold or moisture and are non-freezing. They use only water over and over as the cleaning medium; require no labor and no maintenance. They subdue microscopic particles that escape other systems. That is why the Schneible Multi-Wash protects equipment and workers against grit and dust at a lower cost.

Made in Junior and Senior Models of 2,000 to 30,000 c.f.m. capacity for open or closed circuit collection of dust and fumes arising from kilns, clinker coolers, pulverizers, bagging machines and conveying and storage operations, etc.

Many plants are saving with the Schneible Multi-Wash System. Your plant need not be a "guinea pig"; years of successful operation have proved the efficiency and economy of the Multi-Wash Dust Collector. Send for Bulletin 110 giving operating data and ask for records of specific installations.

CLAUDE B. SCHNEIBLE CO.
DUST SUPPRESSION ENGINEERS
3951 LAWRENCE AVENUE, CHICAGO OFFICES IN PRINCIPAL CITIES

demand necessitates. Car shipments of bulk and bagged cement are made from this point.

River shipments of cement represent about 40 per cent. of the total shipments and are made from a loading terminal on the river bank about ½ mi. from the plant. Bulk cement is loaded at the plant into two special tank bodies mounted on Dodge trucks. These dump the cement at the terminal into a 6-in. Fuller Kinyon pump which conveys it either into a 5,000-bbl. steel silo or direct to the packing dock where the cement can either be sacked by four bag packers before loading or loaded into barges in bulk. The same pump also feeds from the silos to the dock. This silo is being inclosed with a plaster shell with air spaces between it and the steel shell to prevent moisture condensation.

The chemical laboratory is on the second floor of the office building and the physical laboratory on the first floor. The laboratory is equipped with all equipment necessary for the complete testing of cement, including a newly-acquired compression-testing machine made by the Southwark-Emery Co., having a range of O-75,000 lb. Along with the improvements in the plant proper, about 70 of the company houses were modernized and so arranged that each family has room enough for a good-sized garden of its own.

Dealers Testify in Cement-Price Hearing

Two dealers testified before the Federal Trade Commission on June 3 at New York that cement companies in the New York area refused to sell them Portland cement, one after he established a truck company to buy at the factories and reduce his retail price and the other because he imported foreign cement.

The testimony was given before Examiner John W. Norwood on the commission's charge that the Cement Institute and 75 member companies conspired to eliminate price competition in the industry.

Joseph J. Ryan, president of N. Ryan, Inc., which operates three building material and concrete plants in Brooklyn, said he was told by salesmen for domestic companies that there was a "blacklist" and that "we were blacklisted by the domestic manufacturers for handling foreign cement."

This was in December, 1933, he said, immediately after he had received a shipload of foreign cement at a Brooklyn pier.

"We were notified by most all the manufacturers in this area that they would discontinue selling us domestic cement," he added, naming the Lehigh, the Universal-Atlas and the Nazareth companies among those whose representatives made such statements.

Thereafter, he said, he was unable to get orders accepted and after negotiating with an official of the Atlas company wrote a letter, in part as dictated to him, in which he promised to dispose of his foreign supplies. In January, 1935, he said, that firm informed him "that we were removed from that list and by noon that day half a dozen companies called and told us the same thing."

John P. Callaghan, head of a concrete and building material firm in Harrison, N. J., told of establishing a truck company to buy cement at New Jersey plants and deliver it on the firm's jobs, instead of accepting delivery by rail at the Harrison warehouse.

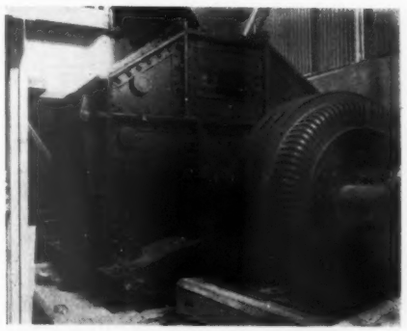
He operated this system for a year and a half, he testified, reducing his transportation costs an estimated 50 per cent. and dropping his retail price when a representative of the Edison Cement Co., with which he dealt, informed him cement would cost him 15c. more a bbl., loaded on his trucks.

Asbestos Experiments Underway in Canada

The National Research Council at Ottawa, Ont., is making a series of experiments on the evaluation of milled asbestos fiber, particularly of the spinning grades. It is hoped to provide a fuller understanding of the various factors which determine the behavior of a given mass of asbestos fiber, and also improving the milling methods and the machine used to extract fiber from asbestos rock.

Hudson *(from page 49)*

elevator into a 300-bbl. bin. A 6-in. Fuller-Kinyon pump feeds the cement through a 1,400-ft. pipe line to a 225,-000 bbl. stockhouse. Cement is reclaimed from storage by a unique device consisting of a traveling crane with



The reversible hammer-mill secondary crusher with reversible motor at right.

two bucket elevators suspended from it. This feeds a screw conveyor to the packhouse. If desired the material from the Fuller-Kinyon pump can be fed direct into this screw. Four 4-tube Bates packers are used for packing the cement before it is loaded into barges. Bulk cement is weighed on a "Conveyoweigh" before it is loaded into barges.

Electricity is purchased from the New York Power & Light Co. and the plant is on a loop system with automatic changeover from one station to another. Current is received at 66,000 v. at the power company's substation on the property where it is reduced to 2,300 v. for the large motors. A substation owned by the cement company further reduces the voltage to 440 v. for the smaller motors and to 110 v. for lights. Frequency sets are used to change 2,300 v., 60 cycle current to 440 v., 25 cycles for motors in the old departments including those driving the kilns, cooler, packer, etc.

In order to avoid peak loads a system of staggered operation is used in which the raw- and finish-grinding departments are each operated 16 hr. daily. The finish mill runs from 11:00 p.m. to 3:00 p.m. and the raw mill from 3:00 p.m. to 7:00 a.m. The two departments run simultaneously only for an 8 hr. period during which there is no quarry load.

This improvement program was designed and carried out by the engineering department of the cement company and was directed by S. J. Robison, chief engineer, under the general supervision of Paul C. Van Zandt, vice-president in charge of operations and engineering. The work in the field was done under the supervision of R. A. Dittmer, general superintendent of the plant. All buildings are so designed that the capacities of any of the plant departments can readily be doubled and conveying equipment has been designed with this in mind. Any future rebuilding of the existing old departments can be done without interference with operations as has been done thus far in the program. With the exception of the storage building already described all new buildings have structural steel frames with corrugated-asbestos siding and Federal tile roof slabs covered with asphalt-asbestos roofing.

Farmers in Illinois Use More Limestone

Illinois farmers applied 1,121,857 tons of agricultural limestone to the soil in 1937, according to a survey by the Illinois Geological Survey. This is more than double the 1935 total of 523,-256 and is the largest amount used in the last eight years.

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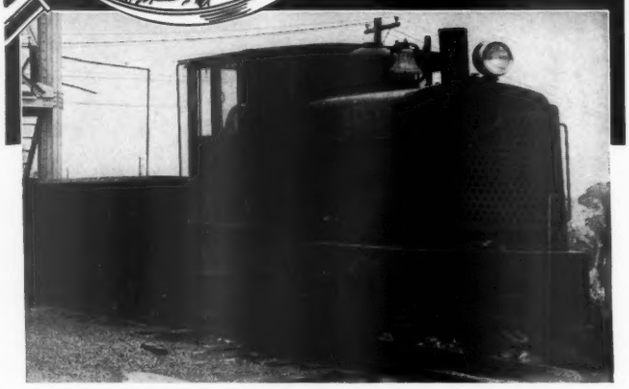

It takes a lot of ants to move a handful of dirt, and they only work in fair weather. A Whitcomb Locomotive has many advantages over ground-contact haulage equipment. It is not handicapped by slippery, rained-out roads. Its power is augmented by a smooth roadway of steel rails. One man hauls many loads at a time with economy and dispatch.

Cut your haulage costs by the extra years of service that a Whitcomb Locomotive provides, and you'll discover a new source of profit. Whitcomb experience in building industrial locomotives, plus Baldwin resources, assure you the finest in locomotive design, performance and economy.

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WHITCOMB LOCOMOTIVES

By A. W. ROBINSON

Eliminating Stack Dust

STACK dust and its elimination form one of the most interesting of current problems in the cement industry. While this dust cannot be considered as injurious to health, it is a nuisance to the neighborhood, and business ethics have progressed to such an extent that it is becoming desirable, and in some cases essential, to eliminate the nuisance for the well-being of the neighborhood. Notes on the progress of studies of dust losses, their causes and remedies, should therefore be of interest in almost every plant.

Differences in dust loading of kiln gases in various plants can be attributed in part to draft conditions, restrictions in kiln exit or housing construction, fineness of raw grinding and method of feeding the kilns, but probably it is mainly due to the difference in rate of generation of CO_2 in the burning operation—a function of the raw materials.

Actual measurement of dust loadings in over one hundred cement plants, by the most accurate method available to date, shows a dust loss ranging from fifteen to more than one hundred pounds per barrel of clinker burned. It is interesting to note that both the minimum and maximum loading obtained were on wet-process plants, with dry and wet plants scattered promiscuously between, thus rather definitely disproving the popular conception that wet process plants have less stack loss than dry plants.

In view of the apparent multiplicity of causes for dust in stack gases, and the practical impossibility of eliminating such causes, the dust problem logically resolves itself into one of suitable dust collection, which depends upon the gas volume, the dust loading, and the dust fineness.

A great deal of speculation has been indulged in regarding just how much dust constitutes a nuisance; how much of it must be eliminated to effectively abate said nuisance; and just how fine a dust can be and still create a nuisance.

For many years there has been in practice in the cement industry a standard method of measuring gas volumes and dust loadings, measuring the gas velocity and volume by Pitot tube, and drawing representative dust samples from the gas stream at exactly the same rate of flow as that of the gas, the weight of these samples giving the dust loading of the gases.

Until quite recently the only dust size analyses available were screen analyses down to 325 mesh. However, the advent of the Wagner turbidimeter and similar instruments, to general use in the cement industry, offers a further dust size analysis which is quite valuable both as a means of determining the fineness of dust to be handled, and to decide how fine a dust actually creates a nuisance.

Admittedly, the Wagner turbidimeter as calibrated for finished cement, is not exactly accurate on kiln dust. Bureau of Standards tests, however, indicate it to be less than ten per cent. off on raw mix, which is accurate enough to throw a lot of light on the stack-dust problem.

While such turbidimeter tests have not been carried out extensively enough as yet to draw comprehensive general conclusions a few typical illustrations will show how important the turbidimeter can be in solving the dust questions involved at almost all cement plants. The analyses in Table I were all made with standard Wagner turbidimeters by experienced cement plant chemists on dust samples drawn from stack gases in careful accordance with standard practice.

The 325-mesh fineness indicated in the above tabulation is entirely in keeping with tests run over a period of years on kiln gases in a hundred or more cement plants, from which it is safe to say that the average cement-kiln stack dust is more than 90 per cent. minus 325 mesh. The turbidimeter results showing micron sizes and surface however, make a more complete picture, indicating fineness and surface comparable to finished cement. The fact that in every case but one, the dust from the gases is more than 50 per cent. minus 20 microns, amply explains why only the most highly efficient collectors have been successfully applied to the gases from kiln stacks, as the required 90-95 per cent. efficiency on such fine dust can only be provided by equipment not adversely affected by fine particle size.

Dust from rock, clay, and shale driers in general fall in the same category as stack dust, as illustrated by the typical analyses in Table II, the first two being on rock driers, and the third on a shale drier.

The turbidimeter can also be used, by "cut-and try" methods, to determine just what fineness of dust actually constitutes a "dust nuisance." This work has not as yet been carried very far, but as an illustration of how it can be applied the writer recently took a representative dust sample from one of the dirtiest appearing stacks in the cement industry, equipped with a collector which does really an excellent job on the coarse dust. The turbidimeter readings for this sample are shown in Table III.

One look at the dirty stack and another at the above analysis showing 90.5 per cent. minus 20 microns, is sufficient to indicate that 20 micron material is decidedly a nuisance. What the dividing fineness is, between nuisance and non-nuisance dust can only be determined by added cut-and-try-tests, but this example will illustrate how it can be done, and that it must be well below the 20-micron size.

Further work along the lines outlined above, is now in progress, and it is hoped in the not too distant future to make available comprehensive data on as many phases as possiible of the cement-dust problem.

TABLE I

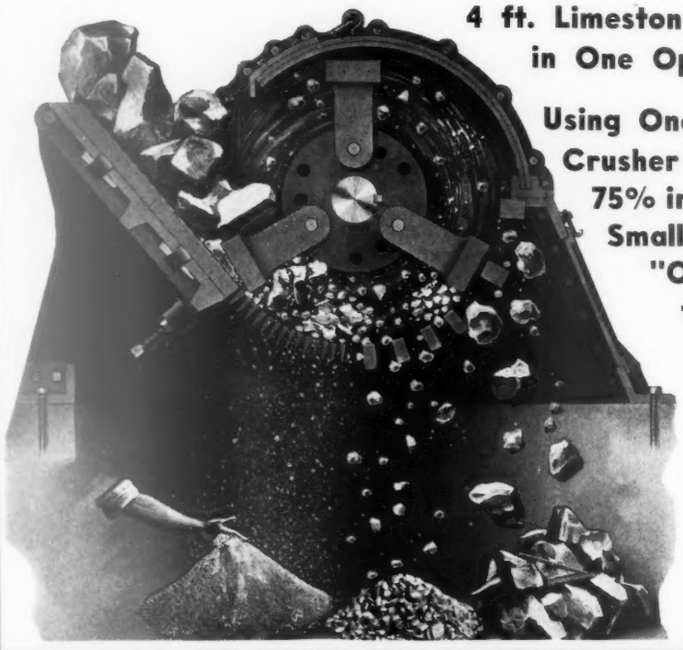
Plant	+325 Mesh	−325 Mesh	Microns −50	−40	−30	−20	−10	Surface
A	2.3	97.7	92.5	88.3	84.8	66.0	40.5	2620
B	4.0	96.0	92.2	90.0	83.3	65.8	35.2	2384
C	10.9	89.1	85.8	75.7	65.7	46.8	17.7	1323
D	6.5	93.5	90.0	83.6	73.4	53.7	19.0	1432
E	9.0	91.0	83.6	80.9	69.8	53.9	23.1	1525
F	3.0	97.0	93.3	89.1	81.5	70.1	41.3	2650
G	7.9	92.1	88.5	81.6	72.2	53.8	22.3	1600
H	12.8	87.2	84.2	78.6	68.3	52.7	25.0	1617

TABLE II

Sample	+325 Mesh	−325 −60	Microns −50	−40	−30	−20	−10	Surface
I	4.4	95.6	87.8	81.5	72.5	55.5	23.8	1791
J	11.2	88.8	81.1	75.3	66.0	51.4	24.0	1542
K	6.5	93.5	90.9	83.4	72.8	53.6	24.0	1628

TABLE III

+325 Mesh	−325 −60	Microns −50	−40	−30	−20	−10	Surface
.1	99.9	98.0	96.5	91.8	90.9	84.5	4390.



4 ft. Limestone to 1¼ inch in One Operation . .

Using One Williams Crusher Saves 50% to 75% in Investment . . Smaller sizes Crush "One Man" Size Stone to 1¼-in., ¾-in., or Agstone

Cover of the No. 7 "Mammoth" crusher. Special attention is directed to the large hopper opening.

The Williams "Mammoth" Crusher is the modern and economical way to crush rock. It takes hard limestone as large as 4 feet and reduces to 1¼" in one operation, taking the place of a primary breaker and recrusher and eliminating the conveyors and elevators for carrying the rock from one crusher to another. Saving in first cost is 50% to 75% and crushing costs are obviously less because of fewer operations.

Williams Patent Crusher & Pulverizer Co.

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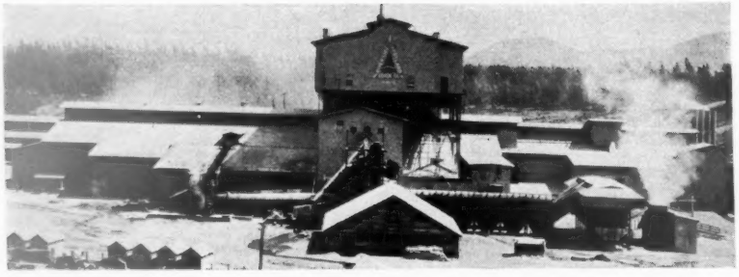

Original Cottrell Electrical Precipitator still collecting dust at this cement plant after twenty-five years of constant operation.

Every Minute Counts

- Cement plants are built to last a long time. Any economy that can be effected from the start adds up as the years go by. The elimination of dust losses is a major economy in two ways: the recovery of material, and the abatement of a nuisance.
- Installations of Cottrell Precipitators made twenty-five years ago are still in successful operation without any expense for repairs in the interval. Although many improvements have been made in the meantime in respect to reduction in size and the addition of automatic features, the early installations still have the low pressure loss, the low power consumption and the high efficiency that make Cottrells superior to all other types of dust collectors.
- Cottrell Precipitators collect everything that floats in gas: dust, fog, fume, mist. They have the simplest operating characteristics. The original investment is the only investment for years of dependable protection and economy.
- Where every minute counts in power consumption, the economy of Cottrells over long periods is the most important consideration.

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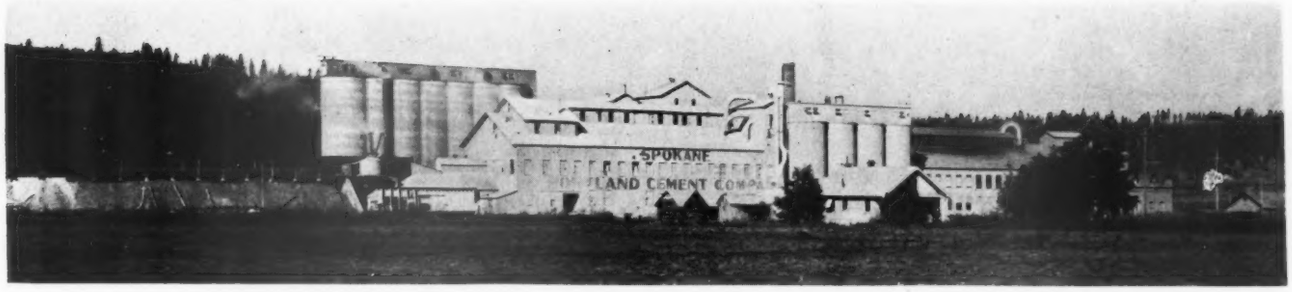


The plant of the Spokane Portland Cement Co. at Irvin, Wash. The rock-storage and cement-storage piles are at the left. In the right foreground are the aërated raw-material blending silos.

OPERATION IMPROVED AT SPOKANE PLANT

By W. E. TRAUFFER

THE Spokane Portland Cement Co. late in 1935 completed the installation of a Lepol kiln in its plant at Irvin, near Spokane, Wash. This was, and still is, the only such kiln on the North American continent. Many other improvements also completed at that time made this one of the most efficient plants in this country. A detailed description published in the January, 1936 issue of PIT AND QUARRY also gave some early figures on the results being obtained with this equipment. The writer again visited this plant recently and obtained the latest operating results which are presented in this article along with a description of some additional improvements made during the intervening period.

As the above-mentioned article described the operations from the quarry to the packing plant in detail only those parts of the operation affected by recent improvements will be described in detail in this article. No changes have been made in the quarry or crushing plant at Powell Spur, 110 mi. northwest of Spokane. The stone is dried, screened and recrushed at the cement plant and is carried by a Redler conveyor to 12 concrete storage bins holding 100 tons each. Four movable Schaffer Poidometers under these bins blend the material and a belt-conveyor and elevator discharge the raw mixture into a 15-ton bin.

Formerly this bin fed a 66-in. by 10-ft. Hardinge conical mill which did all the raw grinding. In June, 1937 a No. 238 Babcock & Wilcox mill was installed to aid in both raw and finish grinding.

A 2-tank No. 18 Polysius Cera pump draws the finished raw material from the bins into four 20-ft. diameter by 46-ft. silos. Polysius aërating systems mix the material in each silo. Each bin is sampled every hour or two. The same Cera pump is used to transfer a blend from two silos at one time into the kiln-feed bins. According to Frank D. Neill, superintendent, this system is a vast improvement over the old bin system and makes possible a control as accurate as is attainable in a wet-process plant. The material drawn off for the kiln feed runs within 0.2 per cent. plus or minus of the average of samples taken from the silos when they are being filled.

As originally installed this dual Cera pump had a capacity of about 40 tons per hr. As arranged then the discharge from one cylinder would be started and the other shut off while it still contained some cement and about 40 to 50 lb. of air pressure. This air would then be exhausted to the atmosphere through a filter, which removed only a part of the dust. Mr. Neill changed the timing by a very simple arrangement of oil interlocking switches so that each tank is entirely emptied before it is shut off and the other opened. There is now a 6-sec. interval between the cycles of 5 to 8 min. depending on the pumping distance. This pump now has a capacity of 60 to 70 tons per hr.

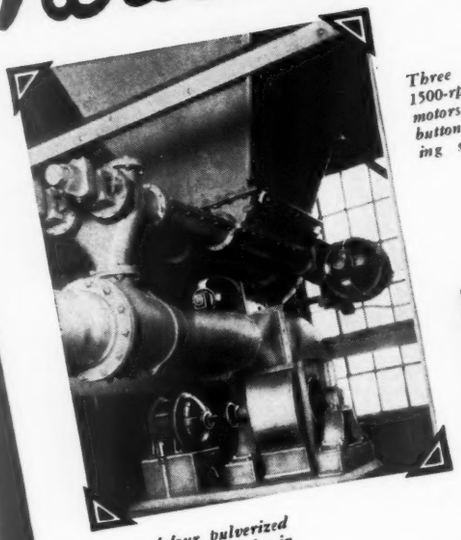
A No. 124 Babcock & Wilcox mill was installed on the Lepol kiln in June, 1936. The results were so satisfactory that a similar mill for the No. 2 rotary kiln was put in operation in June, 1937. According to Mr. Neill, the installation of the mill on the Lepol kiln increased its capacity 100 bbl. in 24 hr. with the same fuel consumption per bbl. The feed tanks formerly used for pulverized coal now are used to feed these mills, which are alongside the coolers in the pit below the kiln floor. A belt-

The top of the new mill which can be used for either raw-material or clinker grinding. Above is the new 12-ft. separator.

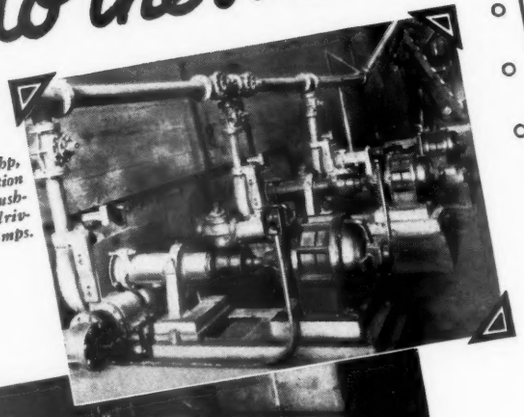
Another view of the new mill with feed bin at right. The separator is behind the dual elevator at the left.

ELECTRICAL MAINTENANCE

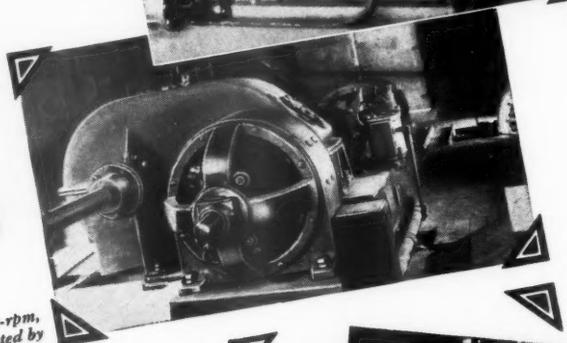
Notes on trip to the Plant



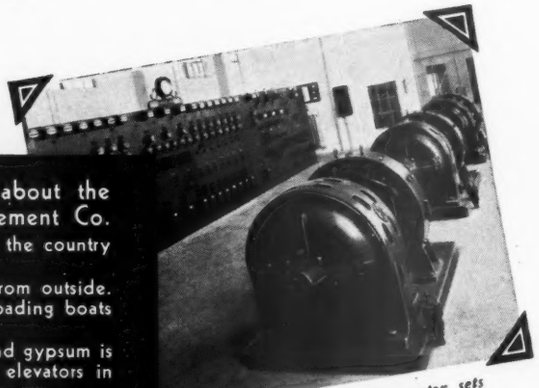
One of four pulverized coal feeders and air blasts to kilns. G-E 30-hp induction motor drives fan and two G-E d-c motors drive coal feed screws.



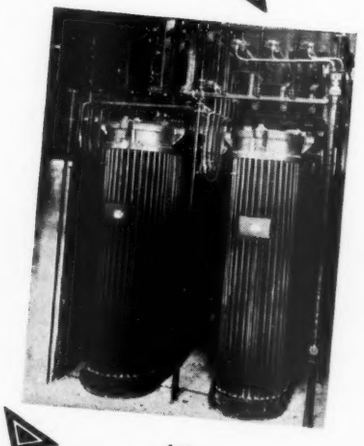
Three G-E 30-hp, 1500-rpm induction motors, with push-button control, driving slurry pumps.



G-E 175-hp, 600-rpm, d-c motor, operated by variable-voltage control, driving 100-ton freight car elevator.



Three G-E d-c motor-generator sets for excitation of synchronous motors and for direct-current power. (Left) Main switchboard and control panels for operation of the principal motors in the plant.



Two G-E autotransformers for supplying reduced voltage for starting principal motors.

Some Interesting Facts about the Great Lakes Portland Cement Co.

Plant is one of the largest in the country (8,000 barrels a day).

Raw material is all shipped from outside. Limestone comes by self-unloading boats from Rogers City, Mich.

All coal, limestone, shale, and gypsum is taken up 55 feet on huge elevators in 20-ton hopper cars.

Location near Niagara Falls means very cheap source of power.

One of the first cement plants to have centralized switchboard control of principal motors.

GENERAL

Filing No. 153

ONLY 28¢ PER HP A YEAR at Great Lakes' 100% G-E Equipped Plant

THAT *is* low maintenance, especially when you consider that 28 cents per horsepower (labor and material) includes the upkeep of switchgear, control, and generators as well as of the 11,000 horsepower of motors in the 8,000-barrel-a-day, 4-kiln plant of the Great Lakes Portland Cement Company at Buffalo, N. Y.

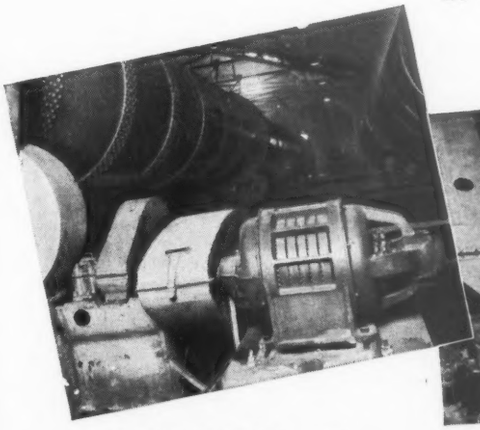
Furthermore, this figure was an average for the five years 1931-36, at the beginning of which period the equipment already had had five years of 24-hour-a-day, seven-day-a-week service.

Electric equipment doesn't have an easy time in a cement plant. There are plenty of hard jobs that must be done electrically.

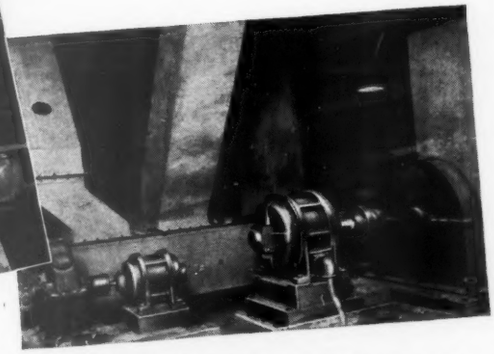
What factors have contributed to this low-maintenance record?

An important one is Great Lakes' well-organized maintenance department, which takes care of the equipment in a highly efficient manner. Another is the sturdiness and dependability of the G-E equipment. Again General Electric equipment — reliable, correctly engineered — is helping a rock-products plant to get low costs and continuous operation in the production of a high-grade cement for roads, dams, bridges, and other great construction projects.

For information as to how General Electric can help *you* with *your* electrical problems and thereby help you to get efficient, low-cost production in your plant, call our nearest representative. General Electric, Schenectady, N. Y.



G-E 100-hp 375/750-rpm wound-rotor motor driving one of the four 250-foot kilns.



Two G-E induction motors driving main and auxiliary screw conveyors under silos. There are four similar pairs in the plant.

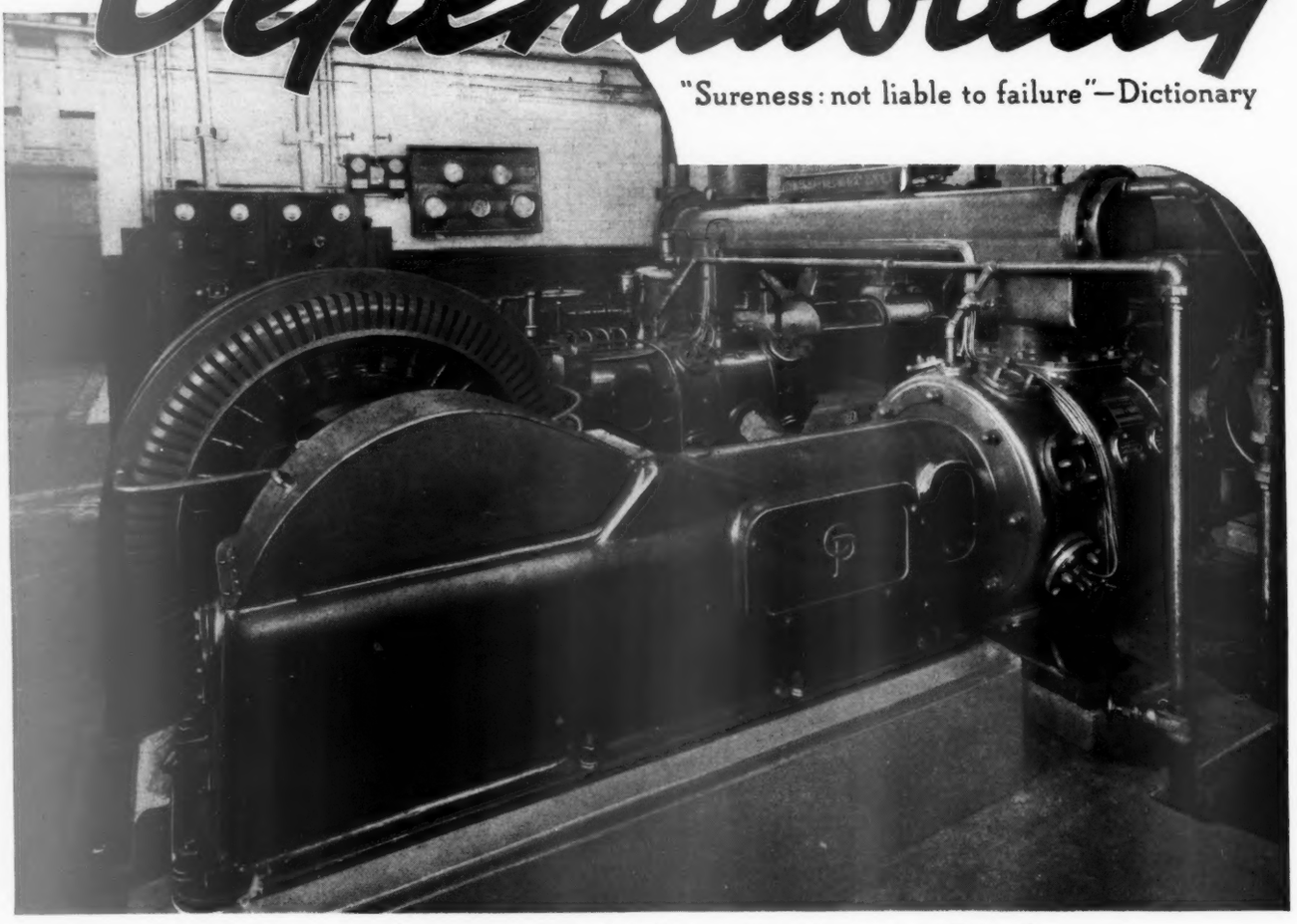
GENERAL ELECTRIC

011-339

Industrial Engineers have a word for it:

Dependability

"Sureness: not liable to failure"—Dictionary



Dependable compressed air power is assured in this prominent plant by two CP Air Compressors

The "sureness" of CP Air Compressors . . . the ability to stand up, year after year, with sustained high efficiency, under heavy-duty, 24-hour continuous service . . . has been demonstrated again and again to engineers in all industrial fields. Time after time, appreciation takes form in that most significant of all endorsements . . . the "repeat" order.

Simplate Valves, efficient regulation, properly designed air passages, accurate machine work, reliable lubrication, etc., all combine to achieve the outstanding dependability of CP Air Compressors. All are described in illustrated bulletins . . . gladly sent on request.

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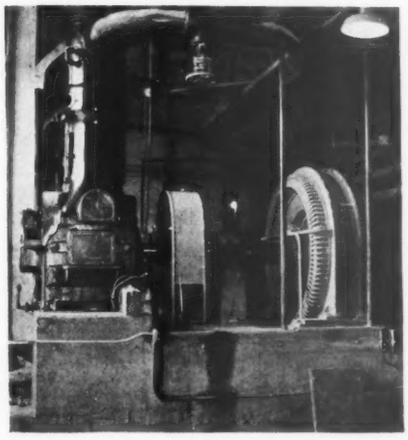
CP **COMPRESSORS**

C-7-38

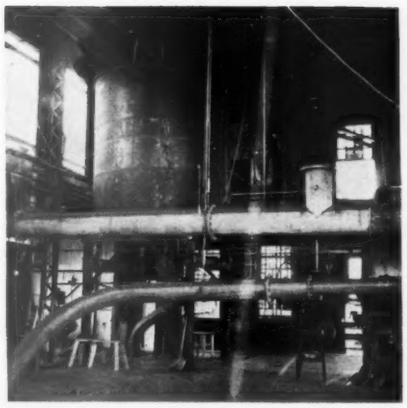
conveyor with a tripper feeds coal into these bins from storage. Drying air drawn from the kiln hoods keeps the temperature in the mills between 150 and 160 deg. F.

Each of the mills grinds 36 tons of coal in 24 hr. to a fineness of 90 to 92 per cent. through 200-mesh. These figures include 2 to 7 per cent. of water in the coal and include the waste from starts and stops. The coal is ¾-in. minus with a high percentage of fines. It ranges from 13,000 B.t.u. with 11 per cent. ash down to 12,200 B.t.u. with 12½ per cent. ash.



The compressor which serves the pneumatic conveying systems and other plant operations.

Up to Oct. 1, 1937 the Lepol kiln has produced 672,964 bbl. of cement, almost all modified Type B. In these two years of operation only a few minor repairs have been necessary. Almost the only item of expense has been the replacement about every three months



The kiln-firing floor showing the coal-mill feed bin above left and the burner pipes from the mills on the floor below.

of the abrasion-resisting steel teeth which keep the nodulizer drum clean. These cost $72 to replace.

According to Mr. Neill, the Lepol kiln in 1937 averaged 1,050 bbl. of modified Type B cement in 24 hr. with a coal consumption of 65 to 67 lb. per bbl. These figures include the time lost in shutdowns, starts, stops, etc. It has been found that attempts to obtain greater capacity result in overloading and that lower capacities result in burning back too far with a resulting dirty kiln and increased fuel consumption. At the above capacity the optical-pyrometer reading on the kiln coating is 2,700 to 2,750 deg. F. At this temperature the free lime content is kept between ½ and 1 per cent. A drop in temperature to 2,600 deg. F. raises the free-lime content to 1½ per cent. When burning standard Portland cement the capacity is a little lower and the fuel consumption per bbl. somewhat higher. The Lepol kiln uses almost no excess air in its gas analysis for lowest fuel consumption, averaging 0.1 to 0.2 per cent.

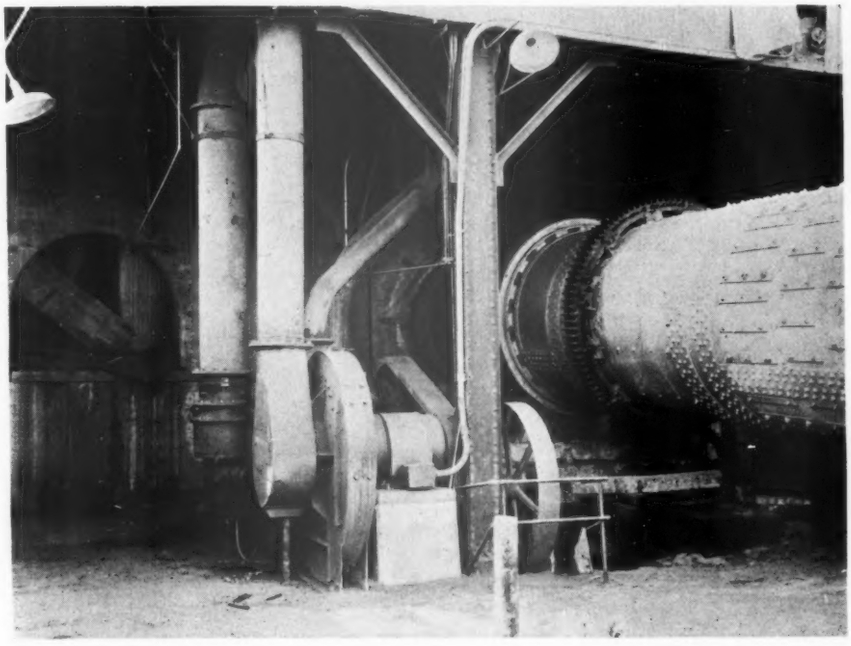
Some experimenting has been done with an automatic system for maintaining a steady flow of air through the kiln while varying the amount of air passing through the drying section with the density of the clinker bed on the Lepol grate. At present some cold air must be admitted into the drying zone to prevent adherence between the nodules while drying and to keep them from sealing the grates which they will do if the CO content is too high. Mr. Neill believes that such an automatic control system would save considerable fuel and increase the kiln capacity materially. The present system of slowing down the kiln to free the draft requires building up to the peak again and this process is much slower than in a rotary kiln.

One of the two direct-firing coal-grinding and drying mills located on the floor below the kilns.

The No. 2 rotary kiln was never used for the production of modified cement before its coal mill was installed. This kiln has produced an average of 900 bbl. Type B cement daily with a fuel consumption of 85 to 90 lb. per bbl. It is 8½ ft. in diameter and 160 ft. long. It has a higher dust loss than the Lepol kiln and the cement produced is slightly higher in silica and lower in free lime than that produced by the Lepol kiln. The rotary kiln averages 2 to 4 per cent. excess air in its gas analysis.

The Lepol kiln with its larger fan, nodulizer, grates, coal mill, etc. actually used 180 hp., or 100 hp. more than the No. 2 kiln with its related equipment, and requires one more man for its operation.

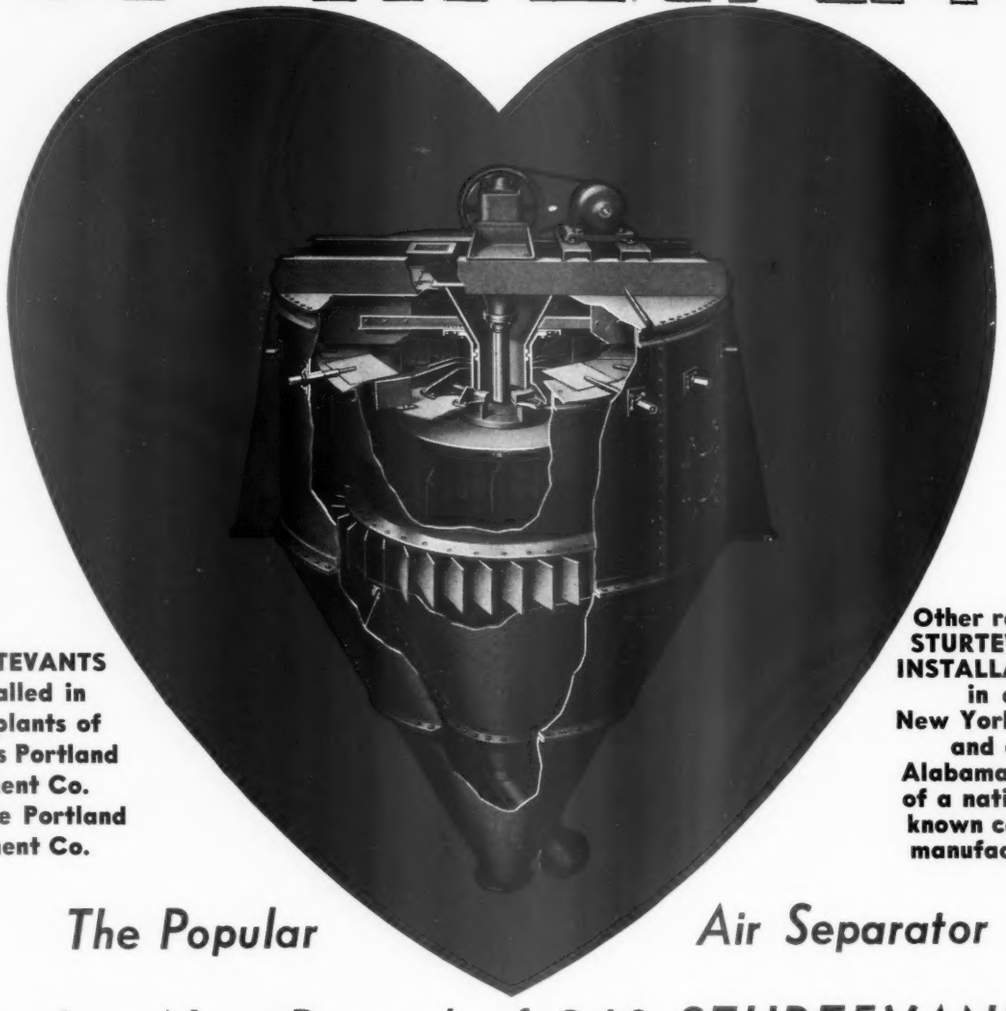
When the former article was written raw grinding was done by the Hardinge mill and the finish grinding by a No. 360 Babcock & Wilcox Type B mill in closed-circuit with a 16-ft. Sturtevant separator. The latter mill was installed with provisions for raw grinding as well, but it has never been used for that



Another view showing one of the two coal mills and one of the two rebuilt rotary coolers.

The Heart of the Cement Plant

STURTEVANT



STURTEVANTS installed in new plants of Kosmos Portland Cement Co. Spokane Portland Cement Co.

Other recent STURTEVANT INSTALLATIONS in a New York plant and an Alabama plant of a nationally known cement manufacturer

The Popular Air Separator

with a New Record of 240 STURTEVANTS in the Cement Industry alone

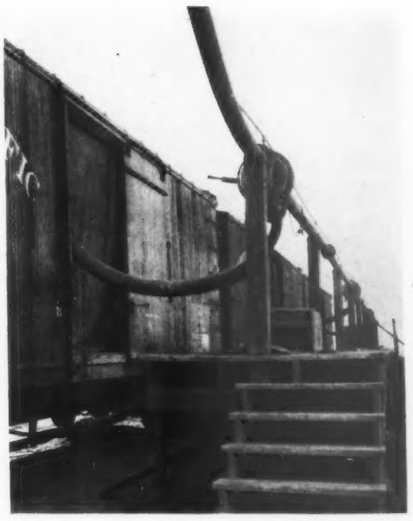
What does this popularity mean?

Producers must be sold on the performance of this modern Separator. It must be doing the job right—and giving the results that are so necessary in making "high early" cements to meet today's specifications.

If you want to control particle size and surface area—to increase mill capacity—or maintain lower temperatures as well as lower production costs—then hook a Sturtevant 1938 Model into your closed circuit line.

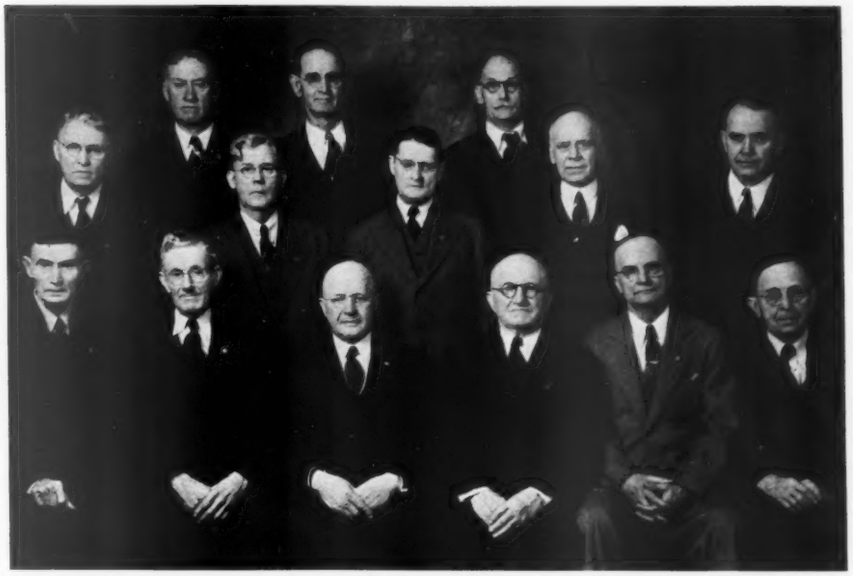
Write for Details

STURTEVANT MILL COMPANY, BOSTON, MASS.
HARRISON SQUARE



The pneumatic-conveyor pipe-line with four valves which make it possible to load four cars without moving them.

Louisville Cement Co. Veterans



These fourteen veterans of the Louisville Cement Co., Louisville, Ky., have been in the continuous service of the company for more than 45 years. Reading from left to right, together with the year of their employment, they are: FRONT ROW—Albert Lamaster (1886), bag dept.; Menander Wells (1890), store manager; Henry S. Gray (1883), secretary-treasurer; Ernest Seibel (1892), packing-house foreman; Robt. Hinton, Sr. (1886), power dept.; John Rady (1889), locomotive engineer. SECOND ROW—Hamilton Lamaster (1889), rotary-kiln dept.; Ed. Stoner (1891), locomotive engineer; H. Warner Overley, Sr. (1887), asst. treasurer and auditor; John G. Davidson (1890), asst. secretary and cashier; J. H. Lemmon (1889), superintendent. THIRD ROW—Harry Regan, Sr. (1889), quarry superintendent; Robin Proctor (1885), quarry foreman; J. Frank Blunk (1884), foreman, rotary-kiln dept.

purpose. No change has been made in the flow of material to and from this mill. The new No. 238 Babcock & Wilcox Type B mill now alternately supplements the Hardinge mill on raw grinding and the larger B & W mill on clinker grinding at 6-day intervals, when both kilns are in operation. When only one kiln is operating, the No. 238 B & W mill is used alone for raw grinding and the No. 360 B & W mill for clinker grinding.

The No. 238 B & W mill has an output on raw material of 16 tons per hr. ground to 93 per cent. through 200-mesh. From 220 to 230 kw. of electricity is used by the entire circuit including the separator, elevator and screw-conveyor. This mill grinds 20 to 25 bbl. of clinker per hr. to a specific surface area of 1,850 using 240 kw. for the circuit. The No. 360 B & W mill has averaged 60 bbl. of clinker per hr. during 1937, grinding to over 1,900 surface area. The mill motor alone pulls 330 kw. and the separator and elevator together pull 125 amp.

The control board for the combination rotary- and grate-type kiln.

In adapting the new No. 238 mill to the former system an automatic solenoid-controlled air gate feeds raw material into the Hardinge mill-feed bin until it is full. Then the feed switches into a pipe feeding the elevator serving the two 30-ton feed bins over the No. 360 mill. One of these bins is used for raw material and the other for clinker, and each bin can serve either of the B & W mills.

The product of the new No. 238 mill goes by a new elevator to a new 12-ft. Sturtevant separator. The coarse material is returned to the mill by gravity. If it is grinding raw material, the finished product of the separator is discharged into an elevator feeding a screw-conveyor which serves the same bins receiving the product of the Hardinge mill. If the mill is grinding clinker, the finished cement is discharged from the separator to the same pump which receives the product of the large B & W mill. Both these elevators are in a single concrete housing. Steel walkways connect both separators and all the other equipment.

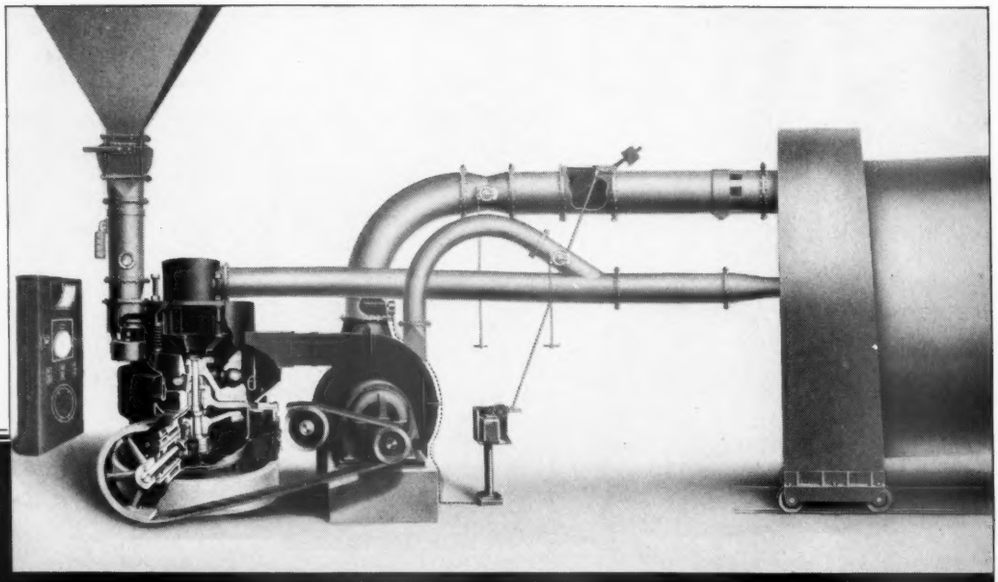
The single-tank Size 18 Polysius Cera pump feeds the modified Type B cement into the four 32-ft. diameter by 90-ft. storage silos fitted with Polysius aërating systems. For bulk loading this cement is pumped through a pipe to a platform, where four separate connections with Polysius valves make it possible to load four cars consecutively without moving them. Each connection has a rubber hose with a screen on the discharge end. Only one of the three bag-packers designed to be used in the new pack-house has been installed.

The standard cement is stored in the old stock-house and is bagged in the old pack-house, both of which remain as described in the previous article.

Supplies Aggregates for Appalachian Dam

Aggregates for building the new hydro-electric dam of the Appalachian Electric Power Co. on the New River near Radford, Va., are being supplied by the Radford Limestone Co., Inc.

The company, whose established commercial plant is located at East Radford, has erected a large plant and quarry near the dam site.



B&W TYPE E PULVERIZER

brings these *New Advantages*

30% Less Power

Operation Simplified

—The only direct firing system with thermostatic control and automatic feeder regulation.

Low Maintenance

—Improved material flow, plus ball bearing steel in grinding balls, provide long life for balls and grinding rings.

B&W Type E Pulverizer—the outcome of the successful application of the ball-bearing grinding principle to well over 500 B&W Pulverizers since 1929. Its construction differs from that of Type B Pulverizers of comparable size mainly in the use of bottom drive and rotating bottom ring.

B&W Type E Pulverizer delivers full capacity throughout life of grinding elements. Tramp iron and pyrites are rejected in the mill.

THE BABCOCK & WILCOX COMPANY
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BABCOCK & WILCOX

C-22

New Equipment for the Cement Manufacturer

• Flotation Machine

The Weinig "Sub-A" flotation machine is not "just another flotation machine," but one which has proven to be very effective in producing the required agitation of the pulp and diffusion of air and reagents, resulting in a more uniform concentrate than has heretofore been possible in general mill practice. It is manufactured by the Morse Bros. Machinery Co., Denver, Colo.

Automatic pulp-level control in the individual cells is maintained by means of a discharge valve regulating the rate of pulp discharge in relation to the volume of feed. A constant froth layer of predetermined depth is maintained, making possible the removal of froth of uniform quality.

An efficient flotation machine.

The Weinig impeller thoroughly agitates and mixes the air, plup and reagents in the lower part of the cells. Violent agitation of the pulp above the impeller is prevented, permitting the air bubbles to retain their values as they rise to the froth level. This improved impeller design provides more efficient flotation, an increased recovery of product, and requires less power.

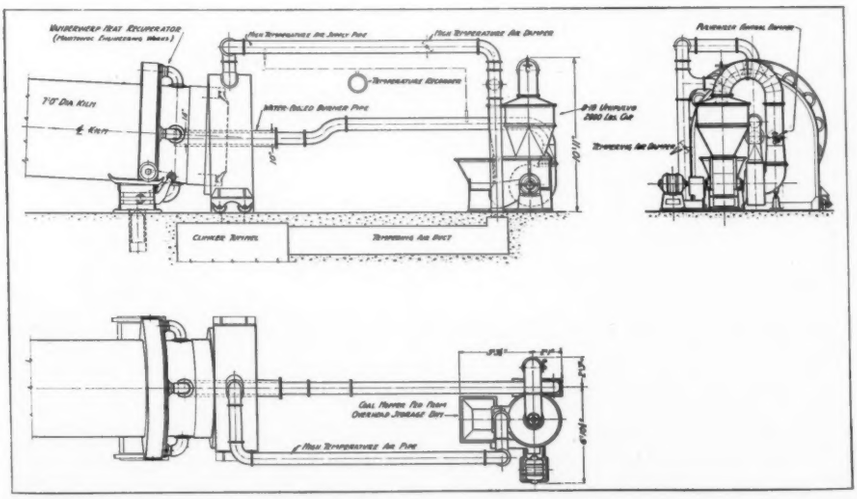
Non-essential operating features and adjustments have been eliminated from the Weinig "Sub-A" flotation machine. The operator has only to co-ordinate the essentials of flotation practice; namely, reagents, agitation and air volume with the pulp level. Proper agitation and distribution of air is assured by the improved design of the impeller operating at its normal speed. After the proper reagents have been established from laboratory tests, it is only necessary to regulate the air volume and to adjust the discharge valve mechanism to maintain the required pulp level.

• Coal Grinding

Before wet coal can be properly pulverized, surface moisture must be freed so that grinding media can become effective upon the coal particles. Dry material can be more readily pulverized, without wasted power or unnecessary wear on metallic parts of the machine involved in the grinding process.

The Unipulvo unit pulverizer, made by the Strong-Scott Mfg. Co., Minneapolis, Minn., has fan capacity sufficient to handle practically all the air required to burn all the fuel pulverized. This relatively large volume of air, preheated, enters the machine simultaneously with the raw fuel, and from that instant until the fuel-air stream is discharged to the burner, hot air and fuel are in constant turbulent contact. The Unipulvo is not a hammer mill; it does not pulverize fuel by impact of rapidly-moving metal in contact with the fuel particles. Grinding is effected by a sandblast action of air-swept fuel particles impinging upon a bed of dormant fuel laying in pulverizing chamber. The high-speed rotor is, in effect, a closed-end fan, sweeps the incoming raw fuel at high velocity across the dormant bed, and this rubbing or attrition action pulverizes not only the moving particles, but the exposed fuel in the dormant mass as well. Extraneous material, whether of magnetic or non-magnetic nature, remains in the bottom chamber, and is removed periodically as circumstances require. Pulverized product passes directly and continuously to the separator above, only fine particles passing into the fuel-air stream to fan and burner, coarse particles dropping back into pulverizing chamber for further reduction.

No pulverized product fine enough to burn in suspension remains in the grinding chamber, to clog the machine or impede the action of the rotor upon incoming raw fuel. The Unipulvo dries as it grinds, and aspirates the finished product as rapidly as it becomes fine enough to be completely consumed in suspension. The accompanying drawing shows a typical Unipulvo application to a 7-ft. rotary cement kiln.

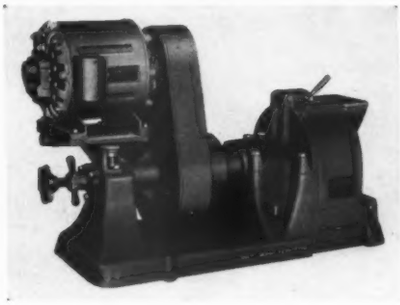


Sketch showing unit pulverizer connection with rotary kiln.

• Pulverizer

In the new DFC pulverizer made by the Denver Fire Clay Co., Denver, Colo., the manufacturer has developed a radical improvement in the grinding action by means of "a direct gyro-shaft drive." The driven disk rotates at 850 to 900 r.p.m.—and at the same time travels through a secondary orbit created by the revolving of an eccentric sleeve bearing, through which the main shaft turns.

Tests have proved that maximum capacity, protection against grooving of the disks, and even accurate control of fineness depend upon a correct relation between the revolutions of the disk and the speed of travel in its secondary orbit. In the DFC pulverizer, this relationship is said to be scientifically correct.



Pulverizer with electric-motor drive.

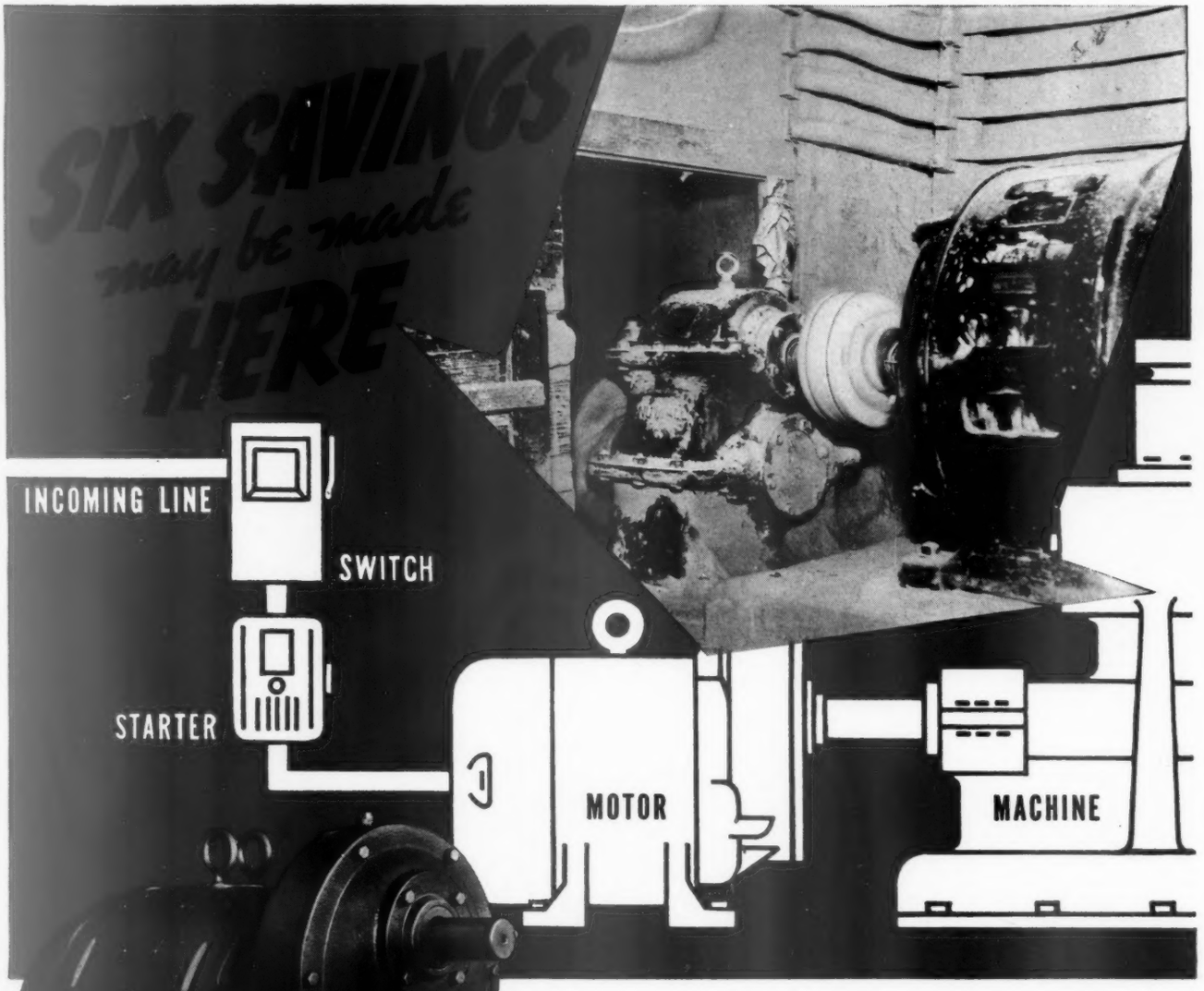
All bearings and gears run in a constant bath of oil from a generous reservoir. Absence of gear trains, manufacture to close tolerances, and rotary action of moving parts make this pulverizer remarkably smooth-running and relatively vibrationless. Adjustment of fineness is made with one hand-wheel and lock-nut at the rear of the machine. Adjustment is not effected by opening the grinding chamber cover.

The DFC pulverizer is available in two models—one for flat belt drive, equipped with tight and loose pulleys and belt throw; one complete with electric motor and V-belt drive integral with machine.

• Coal Pulverizer

A new coal pulverizer characterized by low power consumption, high capacity for a given grinding-ring diameter, low maintenance, and quiet operation has been developed by The Babcock & Wilcox Co., New York, N. Y. It is known as the B&W Type E pulverizer. It utilizes the well-known ball-bearing principle of pulverizing common to all B&W Type B pulverizers and supplants the latter in a certain range of sizes.

High capacity for a given size and power consumption as low as 9 kw.-hr. per ton of Pittsburgh seam coal pulverized to pass 65 per cent. through 200 mesh result from outward radial flow of coal and improved classification of fines. Maintenance costs are low because of the use of improved ball material and increased capacity. Smooth, quiet operation result from isolation of the grinding elements from the housing, short main shaft



Motors geared direct to the driven machine, delivering the required power and required rpm are the simple efficient and modern method of power transmission.

They do not require complicated hook-ups, cost less to install, require less space, save in maintenance, save shutdowns, save accidents, and increase the efficiency of power transmission to from 94 to 96%.

For both economy in installation and operation, it will pay you to get the facts about modern geared drives. Ask Westinghouse—not only foremost in the development of the electric motor, but builders of precision gears for over 50 years. Your nearest Westinghouse office will be glad to give you the facts. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

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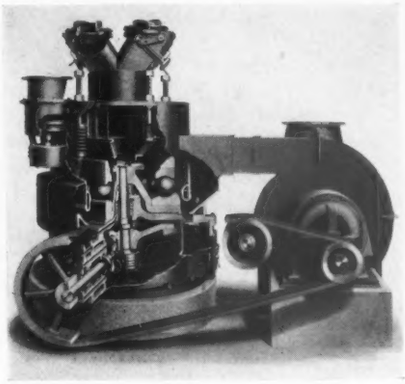
and heavy construction, and its moderate speed.

The coal is pulverized by a single row of large-size balls between a stationary top ring and a rotating bottom ring driven from the base of the mill. Raw coal is fed to the inside of the upper grinding ring and, aided by centrifugal force, passes outward between the grinding balls. Preheated air passing upward between the grinding elements and the housing picks up the ground coal-particles, drying them as it carries them to a rotating classifier



Cut-away view of the new Type E pulverizer.

in the top of the pulverizer whence oversize particles are returned to the grinding zone for further reduction. Fineness of the coal delivered is regulated by the air flow through the mill.

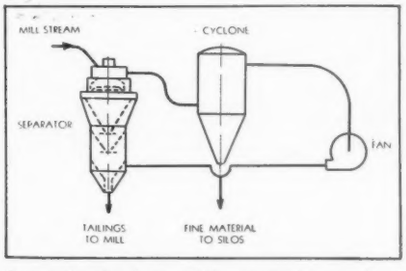
Capacities of the sizes now designed are from 2.0 to 13 tons per hour.

• Air Separator

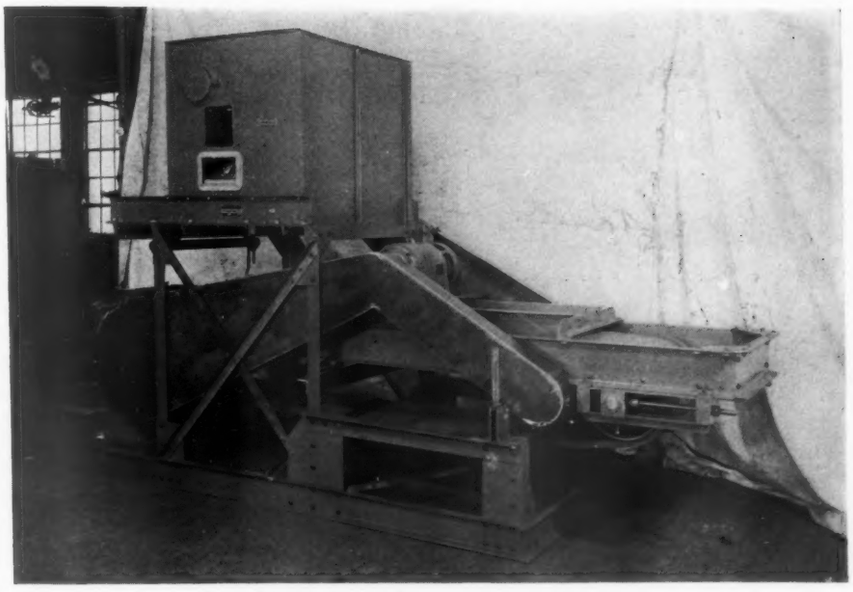
A number of new features which have been incorporated in the F.L.S. multi-stage air separator have been announced by F. L. Smidth & Co., New York, N. Y. These include the use of successive separating chambers, a specially designed cyclone for precipitation of the fines, and an adjustable air current from an independent fan. The separator, designed for closed-circuit grinding of dry raw materials, cement and other pulverized product, can be adjusted to deliver any product with surface areas between 1,300 and 3,000 without the necessity of re-grinding the fines. Increased output, saving in power per unit of grinding-mill output, and extremely flexible operation are claimed by the manufacturer. The accompanying sketch illustrates the operating hook-up.

The company is also marketing a cement cooler which consists of a water-cooled conical tank provided with an agitating device composed of a vertical shaft carrying the agitator arms interconnected by flights which are parallel to the sides of the tank.

The cement is introduced near the bottom of the cooler and is then conveyed in a thin layer along the water-cooled wall of the tank to the top where it is discharged. Subjected



Operating hook-up of the separator, cyclone and fan.



Shop view of pivoted-type conveyor scale.

to the centrifugal force by means of the agitating flights, the individual particles will describe spiral lines on their way up along the cone so that an intimate contact between the cement and the water cooled surface is obtained, thus assuring a high cooling efficiency.

The water required for cooling of the cement is sprayed on the outside of the conical tank from an annular pipe located near the top of the tank. The water adheres to the cone in a thin layer covering the entire surface and is collected and discharged at the bottom of the cooler.

• Conveyor Scale

Of particular interest to the cement manufacturer is the new pivoted-type conveyor Weightometer, a self-contained unit shown in the accompanying picture. It is manufactured by the Merrick Scale Manufacturing Co., Passaic, N. J.

This automatic weighing equipment can be located at any convenient point to receive cold clinker from conveyor or storage bin and weigh it before it is delivered to the mill for grinding. This new model can be installed where space is limited and where the conventional type of conveyor Weightometer could not be accommodated. Variable tensions in the conveyor belt have no adverse effects on weighing, for the reason that the entire conveyor unit is supported from the weighing equipment, the receiving end resting on a fixed pivot with the head of the conveyor suspended from the Weightometer.

Tare weight of the conveyor can readily be balanced out, the weighing machine therefore recording only the net weight of the material carried over the conveyor.

One of these machines recently went into operation at the Bellingham, Wash., plant of the Olympia Portland Cement Co., and two more are shortly to be installed for weighing clinker in a wet-process mill now under construction.

This 30-ton gasoline-mechanical 6-wheel locomotive, powered by a LeRoi 6-cyl. engine, has just been delivered to the Memphis, Tenn., operations of the Missouri Portland Cement Co. by the Davenport Besler Corp., Davenport, Ia. It is the second to be supplied to the cement company by this concern within a year. It employs standard Davenport-Besler rolled-steel slab frames with axle-hung transmission. All equipment to meet I.C.C. requirements is included.

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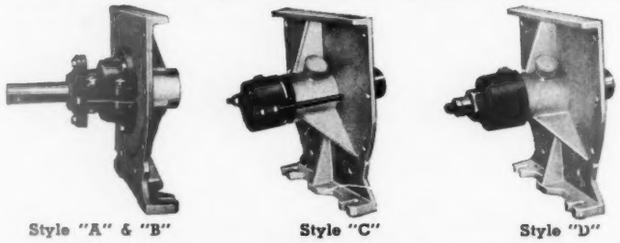

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We have given the same thoughtful consideration to end thrusts as we have to other items and can truthfully say that our line is the most complete on the market. Use end thrusts on your Screw Conveyor installation for efficient operation, lower power costs and minimum repairs.

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We took item by item . . . gave it consideration . . . sought to improve it both from the users, as well as from a manufacturing standpoint. We discovered that modern manufacturing methods, plus new types of machinery and dies, permitted vast changes and important advantages to be incorporated in design and construction. We equipped our shop accordingly. No part of our line is made the old time worn way.

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LIME PRODUCTION PROBLEMS

BY W. R. CLIFFE

Emphasis on Control in Rotary-Kiln Practice

OF more importance than the controversial question of the most desirable length in modern rotary-kiln practice is control. In fact, so complete to the finest detail is this new and, until recently, unheard of control that the "Old Timer", viewing its wonders for the first time, has trouble in convincing himself he is really in a lime plant—supposed to be the orphan of all industry.

Gone are the uncertainties formerly attributed to weather conditions affecting natural draft, and the black smoke which rolled from the stack and caused the management to pull at its thinning hair has been relegated to the ages.

It is true that stone and coal still contain varying degrees of moisture which at times has made them difficult to handle, but to-day we have facilities to compensate for these conditions.

The change from one size of stone feed to another was always a nightmare to the rotary-kiln operator and usually resulted in sending several hours' output of lime to storage to await the next agricultural season; but now changes are made so precisely, with instruments immediately reflecting the condition, that no uncertainty of quality results!

For two weeks following the firing of a kiln of the nineteen-twenties the operator used its immaturity as an excuse for all irregularities in output and quality, whereas to-day he arranges for the disposal of 5 or 10 tons of the first material to come through the kiln as being unsuitable for sales as a first-class product, but with its passage he is producing the same constant quality of lime that characterizes his regular output.

It is a well-known fact that many supervisors of the older type of equipment take their lime-burning plants to bed with them, fully expecting several phone calls through the night and rarely being disappointed. Then again that urgent S.O.S. to get into the work clothes in a hurry is anything but soothing and sometimes affects the "Old Man's" disposition the next day. With today's equipment his chances for being called from his rest are no greater than the average business man's. He leaves his plant at the end of the work day with a feeling of confidence heretofore unknown. Of course there are interruptions, but careful planning has minimized them. However, when they do occur, not only is the kiln not endangered from warping or drawing, but heat is so carefully conserved that from the temperature-recording instruments it is difficult to locate the length of the shut-down on the chart.

In fact so complete has been the transformation, one finds himself asking, "Why hasn't it been done before?" Probably the answer can be found in the fact that until 1937 there had never been a complete well-engineered installation constructed in its entirety. For the stout-hearted fellows who had the conviction and courage to pioneer the rotary kiln in the lime industry there was no experience available. There were concerns who were equipped to build kilns for them, but the supporting equipment had to be decided upon and installed according to the dictates of their best judgment. Out of this confusion came plants that would burn pebble lime, and later the refinement in technique that made possible the experience which is built into to-day's plants.

The larger manufacturing and engineering firms supply practically every unit of equipment which rounds out the whole. Such an arrangement holds great material advantages. Naturally the fabricator is asked to furnish adequate guarantees as to the total cost, the production economy and the maintenance of the proposed lime works. This they are prepared to do and in instances it is possible to finance the venture out of economies which surveys show to be practical. There is then no dodging of the issue; either the plant performs as guaranteed, or sliding-scale penalties. A firm assuming such an obligation can not afford to make a serious mistake; and so it is engineering, engineering, and still more engineering reinforced by practical experience from the very beginning. The first cost figure will undoubtedly be breath-taking to the group considering such a venture, but for the long pull and the business of meeting to-day's sales resistance with a low-production-cost, high-quality product there is no alternative. Also, an advantage accrues to the purchaser of such a service in the form of undivided responsibility. The manufacturer of one unit can not blame failure on some adjoining piece of equipment supplied by a competitor.

This general refinement which is so apparent in lime-plant engineering today is undoubtedly a repetition of the experience of the cement industry, where only in recent years have completely-designed plants with planned production and maintenance costs plus adequate control made their appearance, and who is there that can deny their production and sales superiority?

The acquisition of the knowledge which makes such planning possible has been made very slowly and at great expense, but it is apparent that experience is at long last crystallizing into definite form.

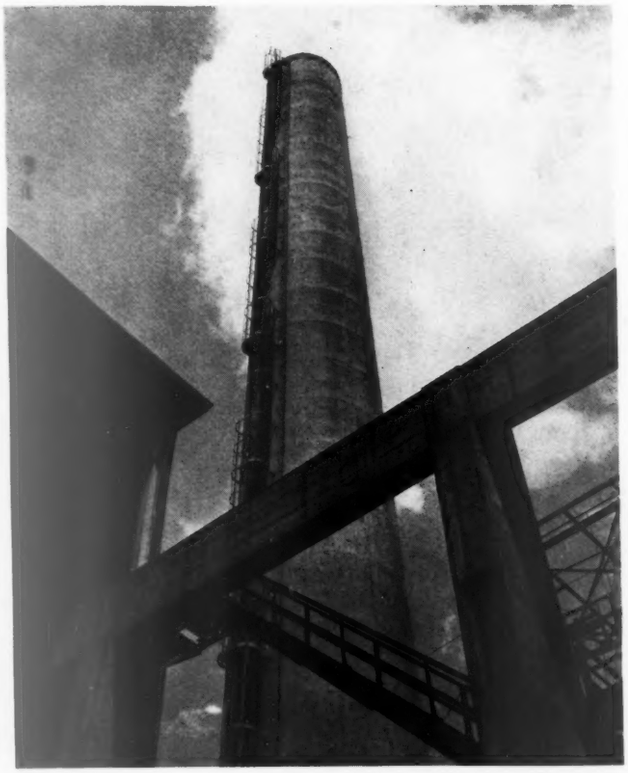
Centralized control can just as well be termed "simplified control," because almost any reliable workman who has never seen the workings of a lime plant can be taught in not many hours to be a first-class rotary-kiln operator. In fact, the project is more likely to succeed with this type of man on the burner's platform than with the chap who has been accustomed to making an adjustment at the same time hoping that within 5 or 6 hours his judgment would be justified. You may assume from this statement that, under modern control, the effect is instantaneous. That is correct; and it is by such methods that stack temperatures can be held within limits that do not vary more than 20 degrees day after day—a line almost as straight as the ruled line on the chart—while kiln speeds are not altered week after week.

It soon becomes a matter of pride with the operator as he views with increasing satisfaction the continuance of straight-line operation as his shift advances. The old tendency of leaving the kiln in poor condition for the shift to follow has passed out of existence; things simply do not work that way. The kiln operator is like the officer on the bridge in full charge of an ocean liner, every instrument for his use easily accessible with little or no manual effort and surroundings so immaculately clean that his white overalls reflect the high state of morale as he goes about his routine duties with a great air of confidence.

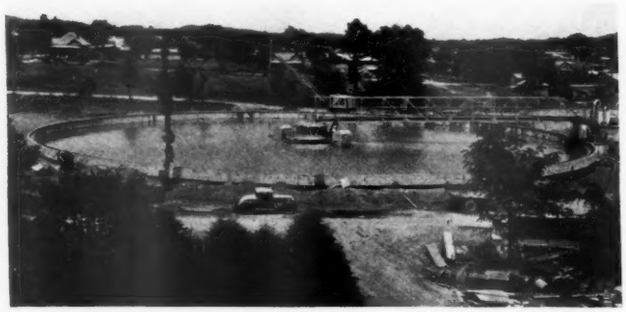
It is only natural that such uniformity

(Continued on page 107)

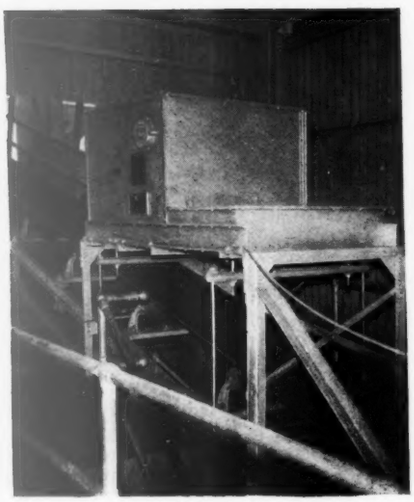
The plant of the Universal Atlas Cement Co. at Leeds, Ala., which has just gone into operation, shown near completion. From left to right are the old and new storage silos, the clinker-storage building, the mill building, kilns and stack. At right are the new office and shop buildings.

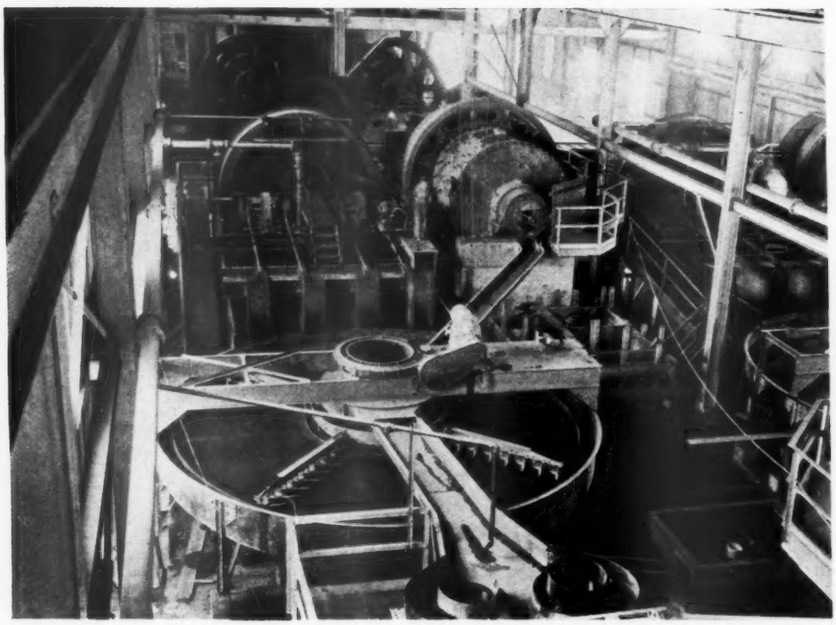


ABOVE: The new air-conditioned office and laboratory building. BELOW: One of the two 200-ft. diameter slurry thickeners. LEFT: The kiln stack and part of the raw-storage building.

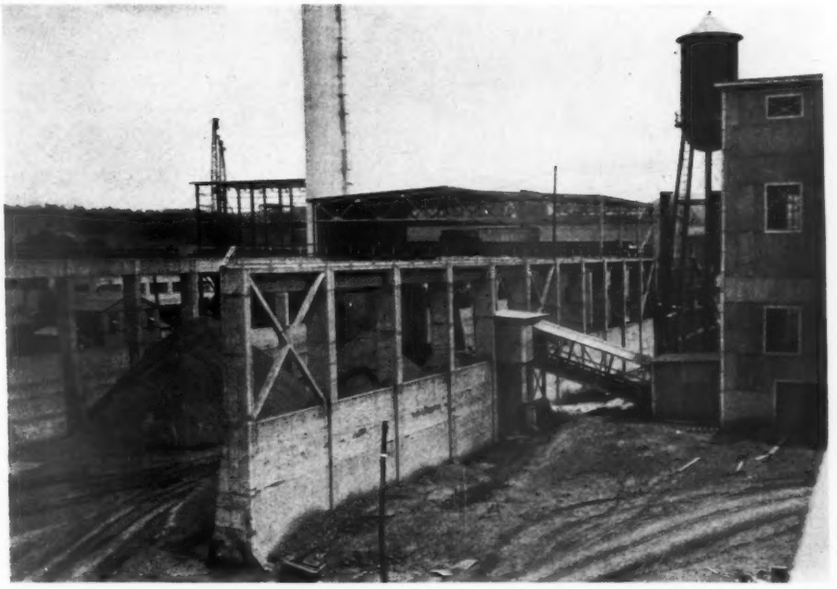


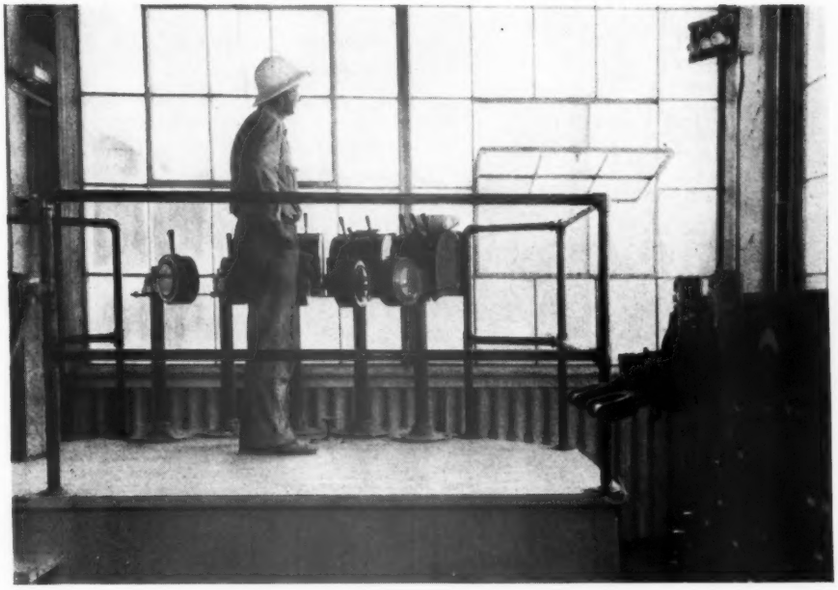
BELOW: The automatic weighing device on the belt conveyor from the crushing department. RIGHT: Interior of the mill building showing raw mills in closed circuit with classifiers. The finish-grinding mills are in the background.





ABOVE: One of the weighing feeders used for proportioning raw materials before grinding in the Universal Atlas, Leeds plant. BELOW: Control room for electric-haulage system from quarry.

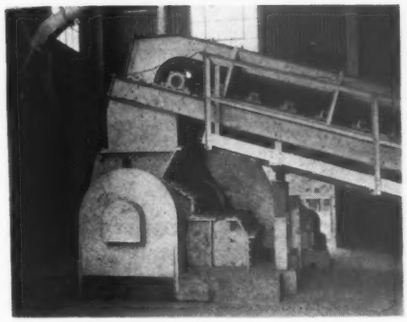


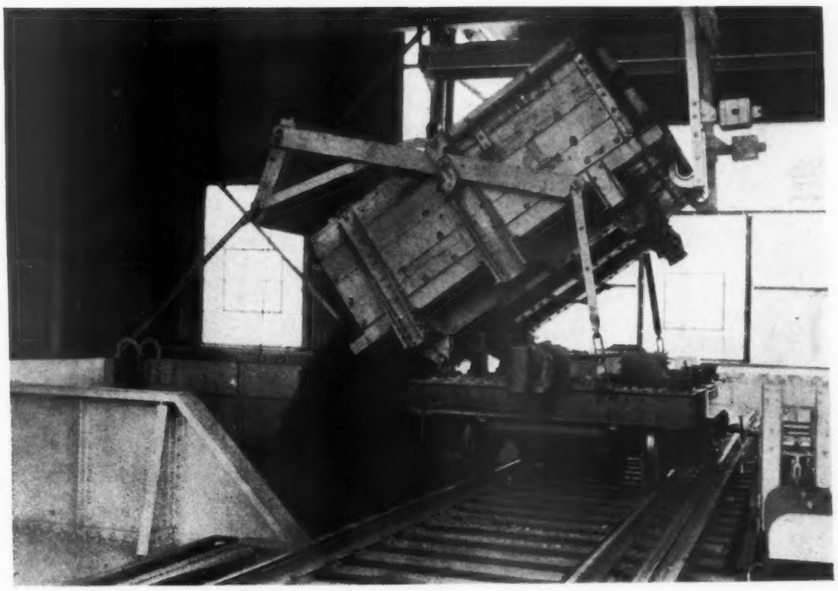


ABOVE: View from crusher building showing conveyor to raw-material storage. In the background is the stack and the kiln-feed building near completion.

ABOVE: Mechanical vibrating feeder which takes product of raw material classifiers.

BELOW: The 42-in. by 66-in. hammermill used as secondary limestone crusher with pan conveyor from primary crusher. RIGHT: Dumping one of the remote-controlled electric quarry cars.

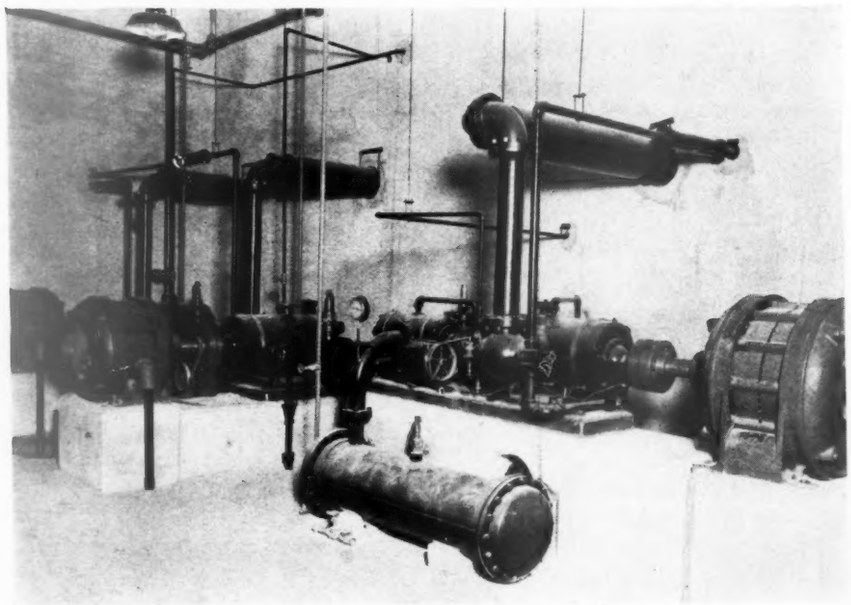




Puerto Rico *(from page 41)*

limestone and clinker-storage building side opposite the kiln-discharge building. An auxiliary tank of 3,000-gal. capacity to supply oil for the kiln oil-firing system and the oil burners of the 25-hp. and 10-hp. boilers, is located on the ground floor of the kiln-discharge building below the burner platform. Two low-speed, gear oil pumps are located in a concrete house adjacent to the large storage tank and 60 ft. from the railroad track. The pumps are of 100-gal. per min. capacity against a pressure of 80 lb. per sq. in. To facilitate pumping the heavy Bunker C oil steam is provided by a 25-hp. oil-fired, vertical, water-tube coil-type boiler located on the ground floor of the kiln-discharge building. A 5-in. oil-transmission line is provided from the track to the storage and from the storage to the auxiliary tank, with an 88-ft. length parallel to the track and four 2-in. hose connections to facilitate discharging four tank cars without shifting. A 2-in. steam line runs parallel to the entire length of the transmission line, the two lines being wrapped together in a single insulated covering to preheat the oil all along the line. Four 1-in. valved steam-hose connections are provided at the track to preheat oil in the tank cars. A suction type fuel-oil preheater installed on the storage tank has a capacity of 100 gal. per min. and is supplied with steam at 16-lb. pressure to heat the oil to 110 deg. F. A coil preheater is also provided in the auxiliary tank. The two oil pumps of the transmission line are so arranged that either pump can be used to pump oil from the cars to the storage tank or from the storage tank to the auxiliary tank. The starting and stopping of each pump can be controlled manually at the pumps or by a float switch in connection with the auxiliary tank. When controlled by the float switch the auxiliary tank is automatically supplied with fuel oil.

The oil-firing equipment, standard for firing the Unax kiln, is manufactured by the Schutte & Koerting Co. and is based upon the mechanical atomization of the oil under high pressure. The burner consists of a primary-air tube approximately 21 ft. long made up of 16 ft. of steel pipe and 5 ft. of heat-resistant steel. The end outside the kiln has a Y-extension, to which is connected by flexible joints the steel pipe to the primary-air blower. To the straight end of the tube is fastened a flanged header to which is welded a socket into which the burner body is fitted. To the burner body is attached a removable extra heavy bronze goose neck, to one end of which is connected a 3-ft. long metal-covered rubber hose from the oil-supply pipe. To the other end is attached the burner pipe proper extending the full length of the primary-air tube. For the burning end of the burner pipe steel spray tips of several sizes and of special design for complete atomization of the oil are provided. The goose neck and burner are held in position by means of a clamp and a quick-release T-handle, while the burner pipe inside the primary-air tube is held in position by means of brackets welded to the inside of the air tube. An extra goose-neck and burner-pipe assembly is provided for quickly changing the steel spray tips from a size required for starting the kiln to sizes required to bring the firing requirements up to full kiln operation. The burning end of the primary-air tube is fitted with three removable discharge nozzles made of heat-resistant steel, the diameters of the nozzles being selected to reduce the size of the air stream below the diameter of the air tube for use at lower oil capacities. This special design of the burner provides for complete atomization of the oil and the proper shaping of the flame by the primary air supplied through the outer pipe of the burner assembly.



The two single-stage and one 2-stage rotary air-compressors.

In order to atomize the oil properly it is preheated and for this purpose is provided a 10-hp. oil-fired Kane boiler to supply steam for a fuel-oil heater having the ability to heat 350 gal. per hr. of Bunker C oil from 90 deg. to 220 deg. C. The amount of steam discharged to the heater is controlled by a thermostatic valve having a bulb inserted in the oil discharge line from the heater to the kiln. For pumping fuel oil from the auxiliary fuel tank into the oil firing system there are two special Schutte & Koerting gear oil pumps. In addition, the oil-firing system is provided with a fuel-oil heater, a suction strainer, a pressure strainer, an automatic oil shut-off valve, two thermometers, three pressure gages, one relief valve, a thermostatic valve, and the necessary pipe and fittings for steam and oil.

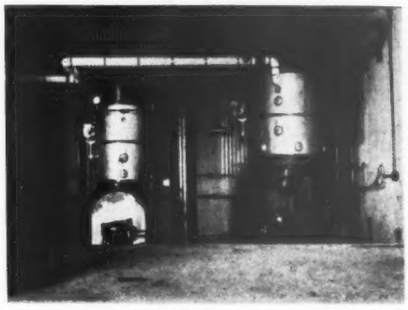
From the oil-supply pipe immediately before the kiln burner connection is a connection through a pressure-reducing valve to supply fuel oil for the Ray oil-burner of the 10-hp. boiler. This boiler is interconnected with the 25-hp. boiler in order to insure steam at all times for the steam oil-heater.

An electric oil-heater is provided to start the rotary oil-burner and to produce steam in the 25-hp. boiler, which in turn will provide steam to preheat the oil in the auxiliary tank for the 10-hp. boiler burner and the oil-transmission line. After sufficient steam is up in the 25-hp. boiler the oil is automatically preheated by a steam oil-heater located adjacent to the boiler and the electric heater is disconnected. With steam provided from the 10-hp. boiler for servicing the steam oil-heater of the

A view of the clay storage with drag scraper in foreground.

oil-firing system the kiln is ready for firing.

Water is raised from a well by a 350-gal. per min. turbine type deep-well pump to a concrete water-tank of 45,000-gal. capacity located on the hillside 120 ft. above the average plant-site elevation at a water pressure at the plant of approximately 60 lb. A Graver Tank type C1½ water-softener of 1,150-gal. capacity on 18-grain water for regeneration is provided on the ground floor of the kiln-discharge building to supply water for the 25-hp. and 10-hp. boilers. A Gould centrifugal size 1¼ H boiler-feed pump is installed for serv-



The 10-hp. and 25-hp. automatic steam boilers.

icing both boilers. A recirculating Gould Size 1 M water pump of 25-gal. per hr. capacity is installed in a pit between the raw and finished grinding mills for the re-use of cooling water used in connection with the finishing-mill spray system.

Electric power will be furnished by the Puerto Rico Railway Light & Power Co. Taps will be taken from both circuits of a 38,000-v. transmission line. Both taps will be carried through automatically selective and interlocked air-break switches to a stub bus, from which a single overhead line is brought in overhead, 1½ mi. to the 3,000-kv.-a. outdoor Westinghouse transformer station located at the plant site where it will be stepped down to 2,300 v. From the transformer station a feeder at 2,300 v. is run to an outdoor switch-house and thence underground to the main switchboard located in the mill building, distributing current to the various large-size motors and to a transformer bank of 440-v. supply. A circuit from the 440-v. switchboard is run to a bank of lighting transformers, providing 120-208 v. to feed a 3-phase 4-wire combination distribution and branch circuit lighting panel. A branch feeder from the main 2,300-v. feeder is run overhead a distance of 1½ mi. to a transformer bank to supply 440-v. current for the clay-pit equipment.

The main switchboard consists of twelve panels which give the switchboard operator control of all the circuits leaving the sub-station, with the exception of the clay-pit circuit, and of the grinding mills, generator sets and hammer-mill, there being however remote control of the latter at the crusher building. Each circuit is provided with a watt-hour meter, so that the power supplied can be determined for the allocation of costs.

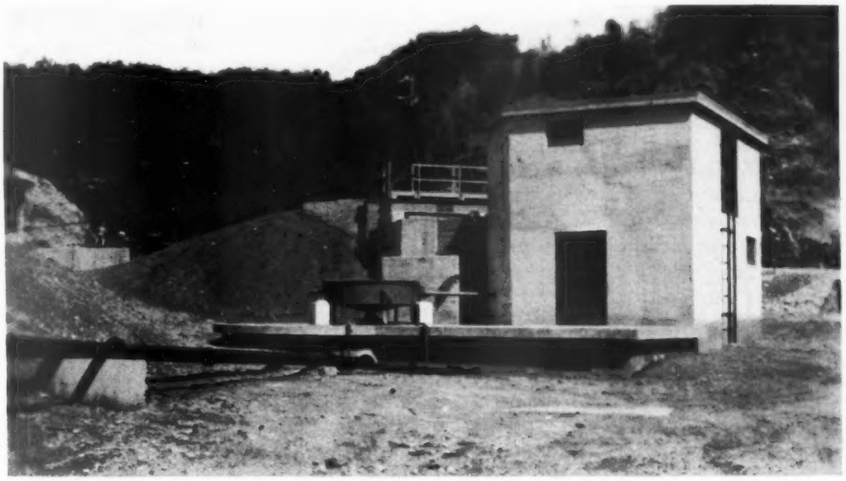
In the switchboard room is a 125-hp., 75-kw. General Electric motor-generator set in combination with a Hall-Scott 132-hp. gasoline engine for use as a stand-by unit. There is also a 50-hp., 30-kw. G.E. motor-generator set. These sets supply 250-v., d.-c. current to the d.-c. kiln and poidometer motors, and excitation for the large synchronous motors. The Hall-Scott gasoline engine is provided as an insurance against damage to the kiln in case of a prolonged power-supply interruption, providing current to rotate the kiln while it cools, to prevent warping and also to supply sufficient power to agitate the slurry. The motor-generator set, being composed of a d.-c. generator and a synchronous motor, may be used to supply both a.-c. and d.-c. current when driven by the gasoline engine. The gasoline engine is flexibly coupled to the m.-g. set through a Bethlehem slip coupling, which is entirely automatic, allowing engaging of the m.-g. set at a certain high speed, but operating without engaging the m.-g. set at a low speed to permit periodic trial test operation of the engine to insure that it is in operating condition when needed. Once the coupling is engaged it must be manually disengaged.

To provide maximum insurance against operation delays, damage to equipment and injury to workmen, the crusher, wet mill, clinker mill and packing departments are provided with electrically-controlled interlocks, green lights signifying motion and red lights and alarm horns indicating trouble. The interlocking system is so arranged that a machine at the beginning of an operation in the direction of flow of the material can not be started until each preceding machine or group of machines is started in consecutive order, with the front machine feeding the material starting last. The starting of each machine is indicated by a green light on the central control panel. The system is also arranged so that if any machine in the line of production should stall for any reason, the preceding machines will stop with the green lights being turned out. The red alarm light and alarm horn is operated when one or a number of machines at the finishing end of the production line stalls.

Compressed air is supplied by two Fuller Type C-120 single-stage rotary air-compressors to serve the Fuller-Kinyon cement pumps, agitating equipment and for general plant use at about 40-lb. pressure. One Fuller Type C-100-50 rotary air-compressor is also installed to provide compressed air at 100-lb. pressure for quarry operations and the machine shop. The 40-lb. compressors are driven by 75-hp. motors and the 100-lb. compressor by a 100-hp. motor. These units are located in the mill building directly adjoining the switchboard room.

Similar plant equipment was selected for the advantages of uniformity and interchangeability, an important feature especially in Puerto Rico—although the government carries at present about a $35,000 investment in spare parts—since replacing parts is not a certainty with only a small stock in the hands of local private dealers often necessitating direct shipments from the United States. Motors and motor-reducers, for example, were selected as far as practical for the maximum number of similar sizes to provide interchangeability but also to reduce to the minimum the number of spare units and parts to be used in the maximum number of places.

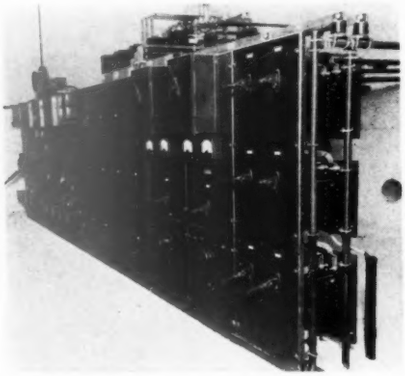
All the electric control equipment is of General Electric manufacture; all the



The clay-wash mill and storage units.

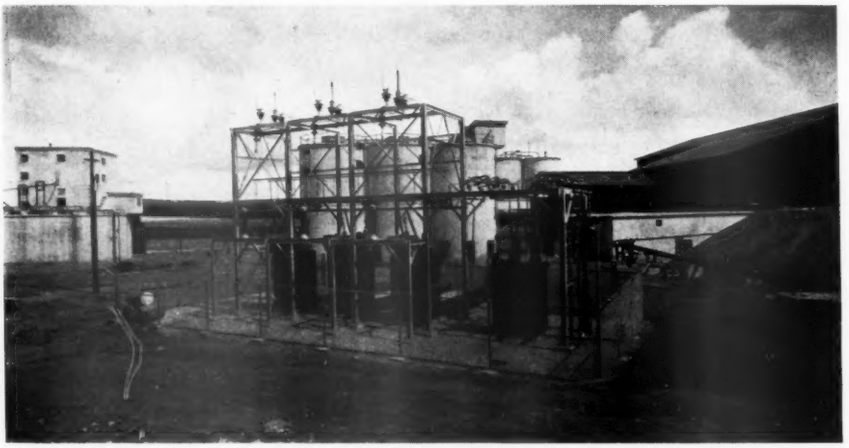
a.-c. motors are of Allis-Chalmers manufacture; all the d.-c. motors were furnished by General Electric; all the speed and motor-reducers supplied by the Falk Corp., all the transformer equipment and accessories were manufactured by Westinghouse; the three large synchronous motors and the 2,200-v. switchboard were furnished by Electric Machinery & Mfg. Co.; and all the screw-conveyors and chain-bucket elevators were furnished by the Webster Mfg. Co. and are of similar types and sizes, thus requiring the minimum number of similar spare parts. The above statement although almost entirely true must be qualified for certain items, since a comparatively small amount of operating equipment was supplied by a different contractor than for the "principal machinery." With government regulations it was impossible for the Administrator to specify any definite make of equipment, since he is almost compelled to accept any make of machine if it complies with the specification requirements.

The kiln feeder building, 43 ft. long, 25 ft. wide and 54 ft. high, has five



A general view of the switchboard.

stories and is constructed of concrete, selected as protection to the equipment against possible hurricanes. The first story merely provides headroom under the kiln dust-chamber hopper for the disposal of dust. The steel dust chamber extends to just below the fourth floor, thus giving the fourth and fifth floors the full building area, namely, 25 by 43 ft. The various floors are called the fan-room floor, kiln-room floor, slurry-trap floor, and feeder floor, indicating the purpose of each. The electrical control equipment is located on the fan-room floor; the gas-analyzer cabinet, pyrometer connections, etc., in the kiln-room floor. The building was made large enough to accommodate a future installation of slurry-filter equipment. The kiln end extends through the center of one end of the feeder building into the dust chamber, thus providing an inclosure for the air-sealing arrangement which is located against the wall of the dust chamber to seal this point of entrance. The stack is located at one side of the feeder building on the center-line of the draft fan, providing a straight breeching connection between the fan and the stack and a convenient end entrance to the building.



The outdoor transformer station located at the plant.

There is a one-story concrete building 16 ft. square for the storage of lubricants. The powder house, 12 ft. square, is located at the extreme unoccupied corner of the property and is constructed of treated wood with sand-filled walls and ceiling. The sides are covered with terne plate and the hip roof with corrugated sheets. The heavy wood door is covered with 3/16-in. steel plate on the exterior side and is fitted with a heavy padlock and cylinder lock as protection against pilferage.

All the agitator equipment power units are inclosed in concrete houses, likewise the slurry pumps at the slurry mixing and storage basins. The pack and bag house, directly adjoining the cement-storage silos, is a structural-steel building with 18-gage corrugated-metal covering, 56 ft. long by 49 ft. wide. The sloping roof is high enough at the silo to accommodate the conveying and packing equipment occupying a width of 23 ft. from the silos and leaving the remainder of the structure as a one-story building with a floor area of 33 ft. by 49 ft. for the storage of empty paper bags and cement-filled bags. The government has on hand 400,000 paper bags from the Elizabeth Paper Bag Co., a subsidiary company of F. L. Smidth & Co.

The machine-shop and store room is a structural-steel building covered with No. 18-gage corrugated galvanized sheets. It is 75 ft. long by 30 ft. wide and is divided through the center to form a store and shop room of equal size. The shop is equipped with one 30-in. 8-ft. maximum center geared-head engine lathe; one power hack-saw with a maximum cutting capacity of 8 in.; one 20-in. vertical sliding-head back-geared drill press; one 60-ton longitudinal type hydraulic press; one pipe-cutting and threading machine of 4-in. maximum; one 21-in. minimum stroke back-geared ram crank shaper; one wet tool grinder with 20-in. wheel; one 24-in. diameter forge; one oxy-acetylene outfit; one 200-ton jack; and miscellaneous equipment.

All the buildings are of much heavier design than those erected for similar work in the United States to withstand the occasional hurricanes. The designs were based on a wind pressure of 52 lb. per sq. ft. of flat surface. The Robertson Protected Metal and corrugated siding is of 18 gage and is fastened every 12 in. with 12-gage straps or their equivalent.

A comprehensive underground drainage system has been provided with storm-water manholes throughout the plant and connections to the ground floors of all the buildings and pits. A system of this kind is almost essential to carry off the water from the frequent torrential rains.

The M. A. Long Co., Baltimore, Md., was awarded the first three sections of the cement-plant project, including the furnishing and installing of the principal machinery, the electrical equipment, the foundation, the buildings, and the associated structures and equipment. The fourth section, including plumbing, electric wiring, fuel-oil storage, oil-supply system and miscellaneous machinery, was awarded to the Viking Construction Corp. of New York.

The government constructed the office and laboratory buildings, the roads, the deep-water well, etc., under separate contracts.

The M. A. Long Co. contracts were directed and supervised by the writer. A. O. McCurdy was employed as field superintendent and T. Hagstrom and O. Hundevad of F. L. Smidth & Co. were engaged to assist in supervising the installation of the machinery.

Much consideration was given to whether to send the Long company's office force and field foremen from the United States or to employ native Puerto Ricans. The decision in favor of the latter proved gratifying as these men proved to be loyal and willing workers. The Puerto Rican foremen were experienced men and as capable in their line as the average American foremen, but this can not be said of the majority of Puerto Rican laborers and mechanics for, as they have lacked opportunities, they are inexperienced in comparison to American workers. Their customs of working and handling tools in many instances are quite different from American methods, as, for example, it may be interesting to note that the native carpenter saws away from himself with the saw teeth pointing up, being the exact reverse of the American manner of handling a saw. A trial of this Puerto Rican method by the reader will undoubtedly prove that the American method is more efficient.

Although the government-established labor rates are low, with lower rates prevailing for many private jobs—the former being 15c. per hr. for common laborers and 35c. per hr. for carpenters—the cost of construction work is more expensive than if American workers at union rates had been employed. Although close supervision was made at all times, much corrective work was required due to the inexperience of the workers.

Because of the fact that no large amount of a given material is available in Puerto Rico, except sand, crushed stone, lumber and miscellaneous supplies, practically all the materials entering into the construction of the cement plant had to be shipped from the United States, requiring constant supervision to schedule the shipments to suit field requirements. Several contracts, however, were entered into with reliable Puerto Rican companies. The Puerto Rico Iron Works, Inc. of Ponce furnished and erected the structural-steel work; Sucesores de Abarca were subcontractors for hauling and installing machinery. The sheet-metal work, roofing, painting, etc., which is usually sublet, was performed directly by the contractors with native mechanics.

The equipment installed in the plant was furnished by the following manufacturers:

Raw and finished grinding mills, grinding media, kiln, electric controls and gas analyzer for the kiln, all slurry-agitating equipment, wash-mill equipment, kiln dust chamber, draft and primary-air blowers, and complete set of related accessories for the above items were furnished by F. L. Smidth & Co.

The oil-firing equipment was manufactured by Koerting & Schutte.

The plant office and laboratory.

The Fuller Co. supplied the pneumatic transport system between the mill and silos and all the rotary air-compressors.

The P & H traveling crane was furnished by the Harnischfeger Corp.

Sauerman Bros. supplied the clay-pit and clay-storage Crescent drag excavators.

The vibrating screen was furnished by the Link-Belt Co.

The Webster Manufacturing Co. furnished practically all the handling equipment, such as bucket-elevators, screw-conveyors, pan-feeders, spouting, etc.

The W. R. Wilfley Co. furnished all the slurry pumps.

The hammer-mill was supplied by the Pennsylvania Crusher Co.

Individual W. W. Sly Mfg. Co. unit filters for dust-collecting have been installed in the crusher, finishing-mill and packing departments. In the crushing department connections are made in the discharge end of the pan-feeder and at the discharge spout from the elevator. In the finishing-mill dust-collecting connections have been made at the discharge end of the mill with other connections provided for if desired. In the packing-house connections have been made to the elevator discharge spout, to the two packing bins, and to the two packing machines.

The kiln stack was erected by the Alphons Custodis Chimney Const. Co.

The kiln was insulated with Johns-Manville Superx insulation.

The poidometers were manufactured by the Schaffer Poidometer Co.

The 10-hp. and 25-hp. boilers were furnished by Mears Kane Opeldt and were equipped with a Ray and a Simplex oil burner respectively.

The Hall-Scott Motor Car Co. furnished the gasoline engine.

The quarry equipment consisting of air-hammers and a wagon drill was supplied by the Ingersoll-Rand Co.

The Robertson Manufacturing Co. furnished and installed the Robertson protected metal siding and roofing.

The well pumps were manufactured by the Byron-Jackson Co. and the water pumps by Gould Pumps, Inc.

Although the Federal government has constructed the cement plant ready for use, the insular government through the Puerto Rico Cement Corp. will operate it. This corporation has been organized under the laws of Puerto Rico. Its officers and directors are:

Blanton Winship, governor of Puerto Rico, president and director; Antonio Luchetti; Jose E. Colóm, Secretary of Interior of Puerto Rico, treasurer and director; Miles H. Fairbank, Acting Administrator, and Guillermo Esteves, Head Adiminstrative Officer, of the Puerto Rico Reconstruction Administration, are directors. Col. Manuel Font, an engineer of many years experience, has been appointed general manager of the cement plant.

Realizing the importance of an experienced operating staff and with no experienced cement men on the island, Col. Font has secured from the United States the services of Walter S. Ernst, formerly plant superintendent of The Cumberland Portland Cement Co., who will act as plant superintendent; Arthur J. Turner and Clyde A. Moser, two experienced plant foremen, and Mr. N. W. Sipe, who will be chief electrician. It is understood that Col. Font will employ several expert kiln burners from the United States. J. L. Schnitzer was

A native resort.

engaged about a year and a half ago by the Puerto Rico Reconstruction Administration as chemist in connection with the cement-plant project and was recently transferred to Col. Font's staff as chief chemist.

The total cost of the project will be about $4.00 per bbl., based on the yearly production of the plant.

The cement plant was scheduled to start operating about June 15.

New Hydraulic Gypsum Cement Holds Promise of Wide Use

PYRAMID builders in Egypt, early Roman artisans, and medieval German masons used hydraulic gypsum and their handiwork has endured through the centuries. But in recent years Portland cement has become a leading construction material, far outstripping all other cementing materials in volume consumed. More than ten times as much Portland cement as calcined gypsum is now made in the United States, and the latter has been relegated in the building industry to wall plasters and a wide variety of products that, though highly useful, are not expected to carry heavy loads or to withstand the ravages of weather.

Hydraulic gypsum plaster, in other words plaster that is relatively insoluble in water and will even set under water, has been made in recent years only in Germany, where it is known as Estrichgip or "flooring-gypsum." As the name implies, this material is used principally for floors, although to a lesser extent, and when blended with Portland cement, it is likewise employed as outside stucco. It can be made into an excellent floor, but it sets slowly and requires considerable skill in manipulation. Moreover, its good properties seemingly are due only partly to German technique in manufacture; a fortunate combination of accessory minerals or impurities peculiar to certain German deposits apparently is a further reason why hydraulic gypsum has failed elsewhere to be used in substantial amounts by modern builders. Estrichgip is made by calcining at a high temperature, much higher than that employed for making ordinary plaster. Intermediate in character between Estrichgip and ordinary plaster are the well-known Keene's cements, which likewise are made at a relatively high temperature and which are modified in chemical composition by the deliberate addition of various salts or compounds as catalysts for promotion of set. Three companies in the United States produce Keene's cement, but the output in 1936 was only 32,167 tons, compared with a total of 1,730,687 tons of all kinds of calcined gypsum plasters and over 20,000,000 tons (112,396,000 bbl.) of Portland cement.

Recently, a new hydraulic cement, different from any hitherto known and possessing extraordinary properties, has been announced. R. S. Edwards, development engineer of the Rumford Chemical Co., Rumford, R. I., who has taken out the first of a series of patents on this invention (U. S. Pat. 2,090,625), described the material before a meeting of American Society of Testing Materials Committee C-11 (Gypsum) on Nov. 18, 1937. Steps in the process include, first, mixing ground raw gypsum (through 80-mesh) with not more than 2 per cent. of phosphoric acid and sodium phosphate and adding silica (or a silicate) if the rock itself is not sufficiently siliceous; second, forming the mixture into pellets in a tumbling drum; and third, calcining at 1,800 deg. to 2,300 deg. F. in a tunnel kiln. Whereas ordinary gypsum is so soft that it can be scratched readily with the thumbnail, the resulting clinker is marble-hard and can be stored for an indefinite period without deterioration. The fourth and final step is to grind the calcined clinker exactly as is done with Portland cement clinker, except that instead of adding a retarder the material is "catalyzed" with an accelerator, usually a mixture of potassium sulphate and zinc sulphate. As explained to the author of these paragraphs, an inversion, or at least a volume change, occurs in the higher range of temperature reached in the furnace, forming a much denser product than ordinary calcined gypsum. The individual particles are coated with several of the higher alkaline phosphates, and this condition, too, exerts a marked effect on the behavior and properties of this interesting material. Still another factor is the elimination of free lime. Virtually all commercial gypsum contains carbonate lime, which is converted in the furnace to quicklime, which, in turn, promotes dissociation of calcium sulphate into sulphur gases and more lime. Even a few tenths of 1 per cent. of calcium carbonate in the original gypsum tends to accelerate grain growth in gypsum cements (unless properly treated) and thus prevent them from attaining their maximum strength.

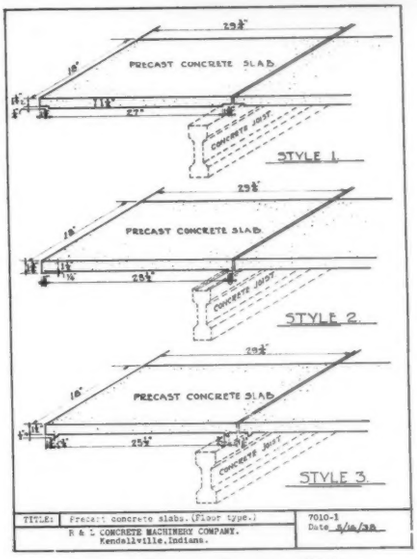
More important than an exact scientific explanation of the unique properties of this new material are the bare facts (1) that it is claimed to be far superior to anything hitherto available in the field of gypsum cements and (2) that it can be made at a cost of only $6.50 to $8 a ton, or in about the same price range as ordinary Portland cement. Tests have shown that it can be made from virtually any commercial grade of rock gypsum, anhydrite, or from synthetic (precipitated) gypsum, the last-named being a byproduct of various chemical manufacturing processes including the production of wet-process phosphoric acid, which is one of the essential ingredients of the new material.

Extraordinary strength is an outstanding characteristic. Whereas ordinary gypsum plasters and even Portland cement have little tensile strength, especially in sanded mixtures, this new cement is said to sustain 600 to 1,200 lb. per sq. in. in tension and has ten times this strength in compression. The further claim is made that it resists the weather with less expansion and contraction than Portland cement and actually withstands the dissolving action of many acids. Add to these advantages the fact that it seems highly resistant to mechanical wear and we have a material that gives promise of becoming widely used in a variety of applications.

So far it has been tested on a semi-commercial scale for only about two years, being utilized first for terrazzo floors in the laboratories of the plant where it was discovered, thus paralleling the main use of its nearest prototype, Estrichgip. It has much to recommend it in the building industry simply to replace ordinary gypsum plasters. For ordinary plastering of walls and ceilings advantage may be taken not so much of its remarkable strength as of its quick-hardening and thorough-bonding properties. The first set can be controlled so as to take place within one to two hours and the final set occurs within four hours. This means that a two-coat or even a three-coat plastering job can be completed all in one day and, because of the lack of free lime in the cement, the room can be painted and occupied in about the time it takes merely the first coat of an ordinary plastering job to become dry. If it is desired to replace Portland cement with the new material, similar proportions of sand and coarse aggregate may be added and still obtain a stronger, more water-repellent, and otherwise better structure that can be used at least as soon as one made with special quick-setting Portland cement. The dense structure and great strength may lead to its use in making both floor and wall tile, replacing ceramic tile. Tests have been made that indicate it also has wide application as an active extender of pigment in paint, and again it may find its way into the abrasive industries.

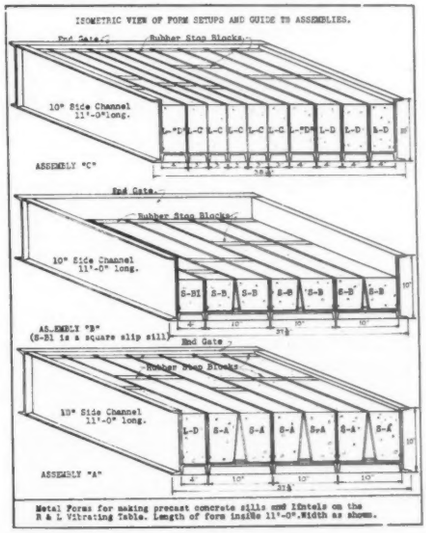
PROFITABLE

Special Section



Above: Precast Concrete Slabs

Below: Forms for Sills and Lintels



Metal Forms for making precast concrete sills and lintels on the R & L Vibrating Table. Length of form inside 11'-0". Width as shown.

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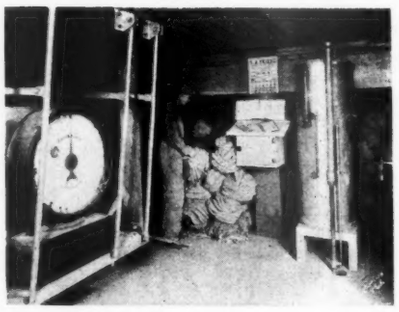
LEFT—The H. O. Seiffert Co. ready-mixed-concrete plant at Everett, Wash., showing its convenient location alongside a viaduct. BELOW — The weighing batcher, scale and water-measuring tank.



Ready-Mix Plant Designed to Eliminate Mechanical Handling

THE H. O. Seiffert Co., Everett, Wash., in November, 1937, put in operation a new ready-mixed-concrete plant of somewhat unusual design and construction. This company had for many years dealt in lumber, building materials, sand and gravel, cement, etc. Sand and gravel were received in barges from plants in the Steilacoom area and were unloaded at a water-front yard. Batching bins were used to supply materials for paving jobs.

In March, 1937, a Chain Belt Rex 1½-cu. yd. truck-mixer was purchased to test the market for this product in Everett. A week later a second identical mixer was purchased. Both were orginally mounted on old trucks, but these were found to be too light for this work. One mixer is now mounted on a new International Model 35 chassis and the other on a new White Model 700 K. Batching was done at the water-front bunkers. These are now being used only to supply water-front jobs.

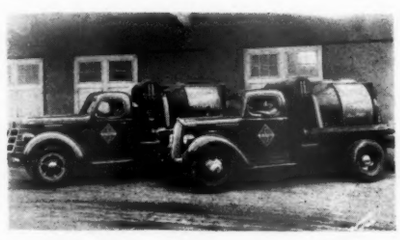
Ready-mixed concrete received an immediate acceptance in this growing city of 31,500 residents, which is located north of Seattle on the shore of Puget Sound. Only by getting the contractors to stagger their requirements has it been possible to meet the demand. Finally the company decided to build a new batching plant at its main up-town yard at 2400 Hewitt St. for more efficient batching and to prepare for the further expansion which seemed inevitable. Additional truck-mixers are being rented from producers in near cities to meet the demand.

The new plant was built at the end of a spur track and alongside a street viaduct which at this point is 25 ft. above ground-level. The elevation of this viaduct controls the height of the bins, as sand and gravel are discharged from trucks at street level directly into them. The batching floor is at an elevation making possible the transfer of sacked cement direct from cars. This design eliminated the mechanical handling of aggregates and cement but made necessary a truck-loading pit 8 ft. below ground-level. This pit allows a 10-ft. clearance below the batcher for the possible later use of larger truck-mixers.

The plant has four 45-cu.yd. aggregates bins from each of which about 35 cu.yd. of material can be taken through bottom-discharge gates. The four clamshell gates feed from these bins into a Butler 2-cu.yd. weighing batcher which has a 10,000-lb. Fairbanks dial scale that can weigh several ingredients cumulatively. Cement is dumped from sacks into a small hopper from which it is chuted into the truck-mixers. Water is measured in a 60-gal. tank with a water-glass gage.

The company also supplies to customers a 2½-cu.yd. hopper and ramp from which the trucks can discharge the concrete. Carts or buggies can then be loaded from this hopper, releasing the truck for another load. This hopper-ramp can be folded up and towed about from job to job. It is equipped with two pneumatic-tired wheels.

The piers and footings of this plant and the truck-loading pit are of concrete. The remainder of the plant is built of wood. The sides of the bins are made of 2-in. by 6-in. boards laminated and 2-in. by 4-in. studs are used for the partitions. Steel tie-rods 1-in. in diameter brace the bins. The bottoms of the bins consist of 2-in. by 14-in. boards laid on edge across a 17-ft. span and supported on 12-in. by 12-in. stringers and posts. At the bin gates two 18-in. I-beams are used. In order to keep the batching floor dry 15-year built-up roofing was applied on the inside bottoms of the bins and 3 ft. up the sides. A sand cushion and planks protect this roofing from contact with the aggregates.



The two truck mixers which serve the plant.

By D. R. (Spec) COLLINS

BLOCK PLANT UTILIZES SURPLUS "FINES"

"GOING" in the construction business in the Twin Cities of Minneapolis and St. Paul had been pretty tough. There had been little but necessary industrial work during the war years. An acute housing shortage had developed, but little had been done to alleviate it. Shortly after the war there had been a flurry of home building, but the depression of 1920 and '21 had halted that. But the skies had a more rosy hue in 1922. It looked as though a home-building boom was in the offing. And it was to capitalize on that boom that the Hedberg-Freidheim Co. was formed.

In April 1922, with its only equipment consisting of a team of horses and a scraper, its major investment a 5-acre tract of land in St. Louis Park, a Minneapolis suburb, this company started a sand and gravel business that was destined to have an amazing growth. Its first operations were merely mechanical —loading contractors' trucks with the sand and gravel which underlay the 5-acre tract. But in 1922 contractors in the Minneapolis area were already becoming a bit "fussy" about the quality of the sand and gravel they used in their concrete work. Bank-run gravel *had* been good enough in the past; but the Hedberg-Freidheim Co. realized quickly that if it was to cut a figure in the larger jobs it would have to supply a screened commodity.

So, just six months after it started in business it made the first major improvement to its property—a small screening plant. Subsequently as the business continued to expand, more equipment was added. Then in 1926, with a market firmly established, a complete new plant was constructed. This new plant, modern in every respect, was able to supply 1,500 cu. yd. of washed sand and gravel a day. Rather a far cry from the team and scraper days of just a few years before.

Hedberg and Freidheim had planned, when they first opened their pit, to go into the concrete-products business. But activities in the sand-and-gravel line soon shoved these plans into the background. But sometimes necessity proves to be the mother of ambition as well as of invention. In 1930 the sand-and-gravel business slowed down. During the years between 1926 and 1932 Hedberg and Freidheim had always had difficulty in disposing of an accumulation of sand and smaller gravel which resulted from crushing and screening operations. This accumulation, they decided, could be marketed possibly in concrete blocks, and at the same time an ambition of ten years could be satisfied. And, in addition, they figured, this new product could be marketed profitably in connection with their sand-and-gravel business, increasing their total sales volume at a time when volume was sorely needed.

Accordingly, plans were made, a plant planned and erected, equipment purchased and in the fall of 1932 the firm embarked on a new business venture that has since proved a valuable adjunct to its regular operations.

Hedberg-Freidheim did not go into this new venture in a half-hearted manner. The equipment which they purchased was the most modern and the lay-out of the new plant contained mechanical innovations surpassed in few modern concrete-products establishments. The first purchase was, of course, a concrete-block machine. Hedberg-Freidheim selected one of the mastodonic Bessers having a capacity of 7 concrete blocks or 14 tiles per min. With the machine came complete equipment for the manufacture of the four sizes of blocks most common in the Minneapolis market. These four sizes

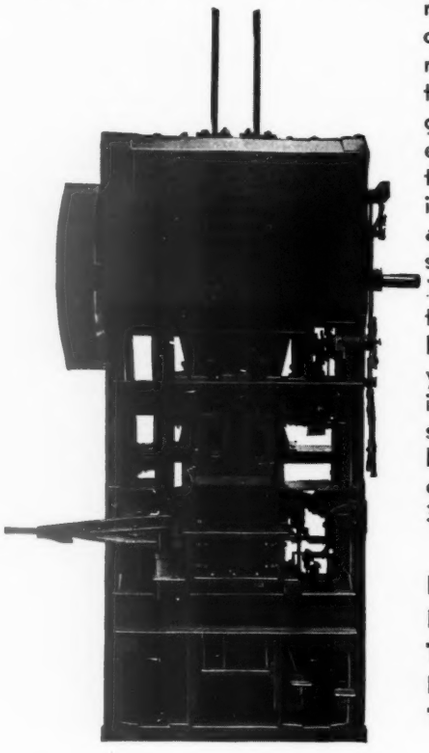
The sand-and-gravel plant of the Hedberg-Freidheim Co. Concrete products are made in the building behind the storage pile at the right.

Stripper which has a capacity of seven units per minute. Power section of the roller-conveyor in foreground.

The products plant and units in storage in the yard.

Write Your Own Ticket to Profits

Get the cream of the concrete block business by using the Multiplex Super Tamper—a sturdy modern type unit capable of using any kind of material, and making five to six blocks per minute in 4", 6", 8", 10" or 12" sizes. Semi-automatic with a time-controlled clutch lever, governing complete operation of filling and tamping. Produces quality blocks, true to size and finished on every side—easy to lay—and insuring distinctive texture and uniformity. Every type of machine you need for this profitable sideline can be supplied by Multiplex—hand or power operated, capacities from 400 to 3000 units per day:



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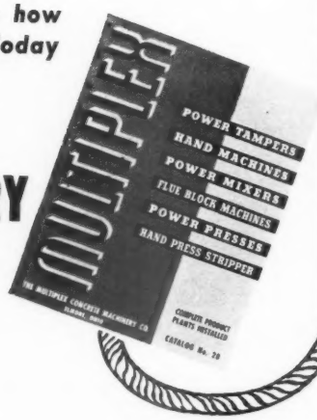

—two of them peculiar to the demands of the Minneapolis trade—8-in. by 8-in. by 16-in., 8-in. by 12-in. by 16-in., 6-in. by 8-in. by 24-in. and 6-in. by 12-in. In addition to these regular sizes the company also equipped itself to make necessary fractionals and also rock-faced units.

The mixer to feed this huge block machine is worthy of special mention. Instead of the usual 20-ft. capacity, common to most concrete-masonry plants, Hedberg-Freidheim purchased a mixer of 50 cu. ft. capacity. Not only would this excess capacity provide for future plant expansion but would allow for full 10-min. mixing for the Besser machine. The sagacity of this selection was soon demonstrated by the quality of the product that the plant turned out and later by the utilization of this unit to mix concrete for a concrete-brick machine having a capacity of 30,000 bricks daily.

Sand and gravel for the concrete blocks and bricks are delivered to the plant from the stock-piles by dump trucks. These trucks discharge the materials into a receiving hopper located below grade and from which a bucket-elevator conveys the aggregates overhead bins. Here the precision in the manufacturing operation starts. These aggregates are discharged from the storage hoppers by gravity into volume-measuring hoppers above the mixer.

The charge which feeds this mixer consists of 60 per cent. well-graded sand running up to ¼-in. and 20 per cent. of gravel running up to ½-in. This is mixed dry for 5 min. and then water, which is measured by an automatic meter, is added. Five minutes more of mixing is then given the batch before it is discharged into a hopper. This hopper in turn feeds a 45-deg. belt-conveyor provided with angle-iron shoes at 18-in. intervals. The conveyor then carried the concrete to the hopper of the block machine.

The operation of the Besser block machine is practically automatic. Empty pallets are fed into it by one man, but the loaded pallets are pulled away by power rollers which transfer the blocks to gravity roller conveyors. Again power, transferred to the rollers by means of a belt, helps carry the green blocks to the curing room. A glance at the illustration of the Hedberg-Freidheim yard is enough to indicate that not only is the manufacturing process carried on with exactitude but the curing process as well.

Always aggressive merchandisers, Hedberg and Freidheim have made out of their concrete-products business a valuable sideline which has proved conclusively to them that diversification, when it is along allied lines, can be a highly profitable venture.

By HARRY F. UTLEY

RIGHT—The forms with the sandstone slabs in position ready to be filled with concrete from the mixer in the background. BELOW—A filled form over the vibrating table.

Light-weight Concrete Building Units Faced With Natural Stone

INSULATED stone, consisting of thin slabs of Briar Hill sandstone of various shades backed up with light-weight (Waylite) concrete, is one of the newest building units on the market and is finding ready acceptance among architects and builders in the Great Lakes area. It is manufactured by the Instone Co., Hammond, Ind., of which M. W. Bradbyer is the head, and other firms are expected to be licensed shortly to make the material.

Mr. Bradbyer is well-known in the concrete-products field, having formerly served as sales manager for the Besser Mfg. Co. The product provides the inherent beauty, dignity and durability of natural stone. It is sold at much lower cost than the full thickness of Briar Hill stone being able to compete directly with standard face-brick costing about $35 per thousand. It can be laid rapidly and economically, the erection cost being about one-third that of solid stone since bricklayers can handle the units with ease and accuracy. Its weight is considerably less than that of solid stone. The Waylite cellular aggregate in the concrete gives excellent heat and sound insulation, has low absorption, and is light in weight. It can be easily cut and worked.

The stone is the well-known Briar Hill sandstone, quarried at Glenmont, O., and long used for building purposes. Slabs 2 in. thick in random lengths and 2½, 5 and 7¾ in. high are shipped to the plant by railroad. These are placed in metal forms in the Instone plant and light-weight concrete is poured on both sides as one of the illustrations shows. The units are commonly 8 in. wide, although the width may be varied if desired. The Waylite aggregate used in the Instone plant comes from the steel mill of the Youngstown Sheet & Tube Co. at East Chicago, Ind. Molten slag as it comes from the blast-furnaces is processed so as to assume a structure that is very cellular, light in weight, tough, noncorrosive and highly insulating.

The forms are mounted on flanged wheels which move on tracks. Concrete is mixed and deposited in the forms by a Koehring 21-E paver which is permanently located in the plant. After pouring, the forms are moved to a Jackson Electric Tamper Co. vibrating table that compacts the concrete to a density which develops a compressive strength of 2,500 lb. or more per sq. in. after curing. The rough surface of the Briar Hill stone develops a strong bond with the concrete backing. This, according to Mr. Bradbyer, is because Waylite concrete has a definite chemical affinity for the silica sandstone, the expansion and contraction coefficients being practically equal.

After the concrete has hardened the units are placed in a machine which splits the 2-in. sandstone slab in the center, producing two units each consisting of 3 in. or more of light-weight concrete faced with 1 in. of natural stone. It will be noted that such a process of manufacture involves the use of stone with vertical cleavage. In general this is regarded as poor practice

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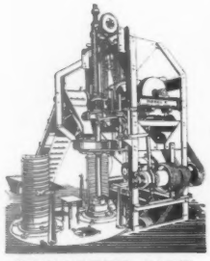

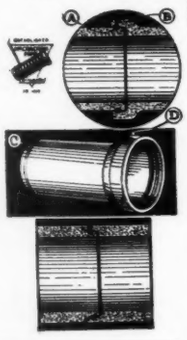

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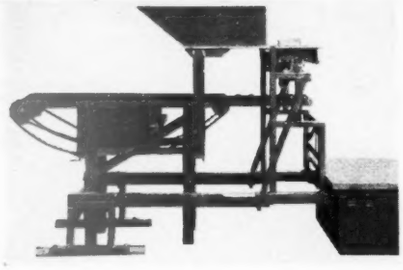

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From the Home State of beautiful homes comes an idea in modern construction— *use of hollow tile for artistic facing* —that is winning the attention of builders in all parts of the country. If you are interested in the concrete block business, be sure to investigate HOLLOSTONE.

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A close-up view of an Instone residence. Note the fine appearance of the laid-up units.

because many bedded stones disintegrate with comparative rapidity when set on edge. However, the Briar Hill stone is exceptional, in that it is durable and does not spall when set with the bedding vertical. It has been so used as an ashlar stone in residences and other buildings for many years with highly satisfactory results.

A number of high-type residences ranging in cost from $7,000 to $100,000 have been built in the neighborhood of Chicago and Milwaukee with Instone. One of the finest examples from an architectural point of view is the recently-completed Wunderlich funeral home at Joliet, Ill., designed by W. W. Alschlager, noted Chicago architect. An exhibit of the material in laid-up wall sections drew much attention at the Chicago Home Show held a few weeks ago in the Coliseum, Chicago, and furnished Mr. Bradbyer with a large number of enthusiastic prospects.

Instone is retailed almost exclusively through building-material dealers and is delivered direct from the plant at Hammond, Ind., to avoid rehandling and any possible breakage. The 4-in. veneer units, delivered within a 40-mile radius of Chicago's "loop," sell for 40 c. per sq. ft. of wall surface.

Mr. Bradbyer is now at work on plans for a new and modern plant which will allow faster and more economical production. Steam-curing kilns will be a feature, the units at present being cured in open storage with an occasional wetting down.

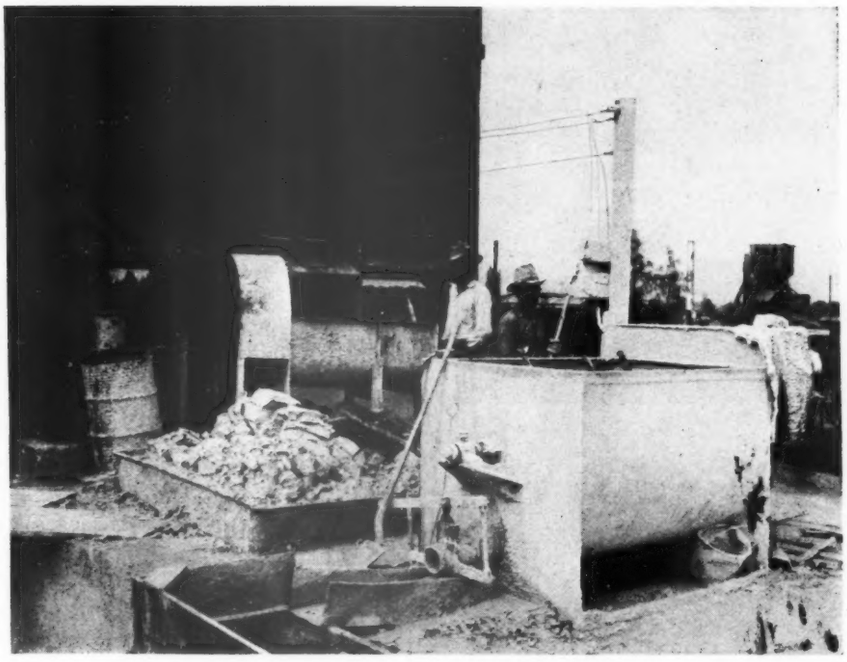
The machine which splits the stone.

Cement, Quarry Safety Sections Are Merged

The Cement and Quarry sections of the National Safety Council have reached the decision that, inasmuch as the accident-prevention work of both bodies is very similar, the uniting of their respective memberships under one group of officers would be of mutual benefit.

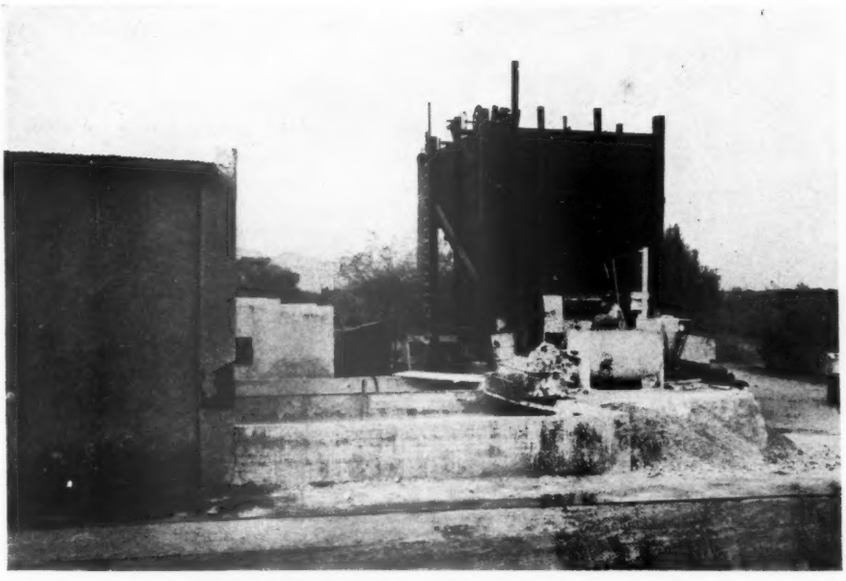
At the Congress in Kansas City last fall, the Quarry section made a formal request that it be combined with the Cement section, and approval has been given by the Cement Section officers and also by the Executive Committee of the National Safety Council.

The merged sections will have the new title, "Cement and Quarry Section." The administrative work will be carried on by the present Cement Section officers until the annual meeting at the Congress in Chicago next October. The Quarry section officers will become members-at-large of the new executive committee.



LEFT: A close-up view with stoker in foreground and mixer and aggregate bin in background.

BELOW: The single vertical kiln, with lime and mortar plant in background.



Another view of the lime-putty and mixed-mortar plant with soaking pits in foreground.

Arizona Lime Maker Supplies Material as Sanded Mortar

THE New Process Lime Co., Tucson, Ariz., in July, 1931 built a modern one-kiln lime plant which was described in the December 16, 1931 issue of PIT AND QUARRY. This plant was built to meet a local demand for building lime, and some lime is also shipped to smelters for use in flotation processes.

Several years ago Gabe Rendon, manager of the company, began to experiment with the production of lime putty and sanded lime mortar. At first a concrete mixer was used for this purpose, but the demand soon exceeded the capacity of this equipment. The process now used is here described.

The quicklime is now dumped into a pit to soak and is then transferred by hand with shovels to a pug-mill-type slaker, wherein the slaking is completed. The lime putty is discharged from this mixer and is then shoveled into a pug-mill mixer located next to a 50-cu. yd. wooden sand-storage bin. The required amount of sand for a batch of lime mortar is discharged from this bin into the mixer through two arc gates. Sand is brought in trucks from local plants and an elevator feeds the bin from the truck hopper.

With the present equipment about 60-cu. yd. of mixed mortar can be produced daily. The lime plant has a capacity of 15 tons of lump lime daily and lime mortar now consumes a large part of this output. Lime putty and lump lime are also used.

According to Mr. Rendon, a pulverizer will soon be installed for the production of pulverized quicklime and this easier-slaking material is expected to increase the capacity of the lime-putty plant and also to improve the quality of this product. A small sand pump will also be installed to transfer the putty from the slaker to a feed tank over the mortar mixer.

The plant as set up near Coldwater, Mich. Proportioning unit at left, mixer at right.

By HARRY F. UTLEY

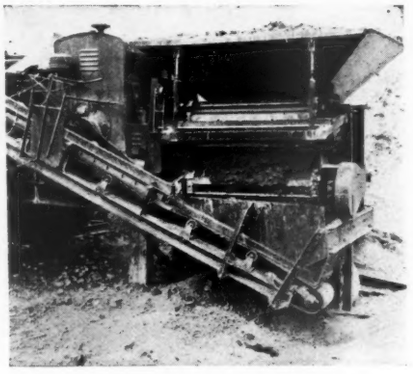
STABILIZING ROAD GRAVEL IN MICHIGAN

After processing the pug-mill discharges the material directly into trucks.

MICHIGAN this year is continuing its broad program of stabilizing its secondary roads with clay and calcium chloride. Shoulders on paved roads are also being constructed with this material and considerable maintenance work is also being done. The work of preparing the plant-stabilized mixtures is, of necessity, scattered in various locations and portable plants which can be moved from place to place as occasion demands are being used to a great extent.

John G. Yerington, Benton Harbor contractor and aggregates producer, is typical of the wide-awake operators who have added the preparation of stabilized material to the scope of their operations. This spring he purchased the first Barber-Greene stabilizing machine to be assembled at that concern's Aurora, Ill., plant and the outfit has been on the move ever since. From May 5 until June 7 approximately 14,500 cu. yd. were processed. The first run was made at the Dubach pit at Coloma where 4,000 cu. yd. were turned out to be used in Berrien, St. Joseph and Van Buren Counties. The next move was to the Martin Reed pit near Allegan where 8,500 cu. yd. were stabilized, some being spread and rolled immediately, the remainder stock-piled for later use. Locating next at Plainwell, Mr. Yerington's plant turned out 2,000 cu. yd. of the material which was stock-piled at the site of operations—the Smith pit. On the night of June 7 the plant took to the road again and moved 100 miles away to the T. J. Mowry pit on state road No. 7 between Coldwater and Colon where the writer stopped in just as the plant was about ready to begin another run.

This Barber-Greene plant is a completely mobile, two-unit affair mounted on pneumatic tires for easy transport. The machine which prepares and proportions the sand, gravel, clay and calcium chloride is an entirely new, well-designed unit. The mixer is an adaptation of a Barber-Greene bituminizing plant, the bitumen-heating equipment being eliminated while the pipes are used to supply water to the mix at the pug-mill. A Northwest excavator handles the crushed-and-screened gravel and sand as well as the clay, dumping into two hoppers on the first machine. A bar-feeder beneath the clay hopper governs the amount of clay fed which, according to the new Michigan Highway Department specifications, must be within close limits of 15 per cent. of the entire mixture. A short, inclined belt-conveyor lifts the clay to a pair of high-pitched screws which



Clay hopper and bar feeder.

reject large pieces of stone. The clay then passes through a set of shredding rolls, one 15 in. in diameter operating at 500 r.p.m., the other 24 in. in diameter and turning at 100 r.p.m. where any remaining stone is nipped out. The rolls are set about $\frac{3}{16}$ in. apart and disintegrate the clay completely. Just as the sand, gravel and clay leave the machine to be carried by a belt-conveyor to the mixing unit, 12 to 20 lb. of calcium chloride per cu. yd. is added through a hopper-feeder over the belt. The material on the belt is in separate layers—first the aggregate, next a thin layer of clay and, on top, the calcium chloride. Thus they are prevented from recombining before being pugged. Only enough water is added at the pug-mill

Calcium chloride being fed to the aggregate and clay.

to produce a damp, compact mass and the finished material is discharged into waiting trucks which haul it away to the job or to stock-piles. The pug-mill, being of the continuous type, has a cut-off gate at the discharge end but the trucks carry the stabilized material away with dispatch so it is not necessary to stop the mill between loads.

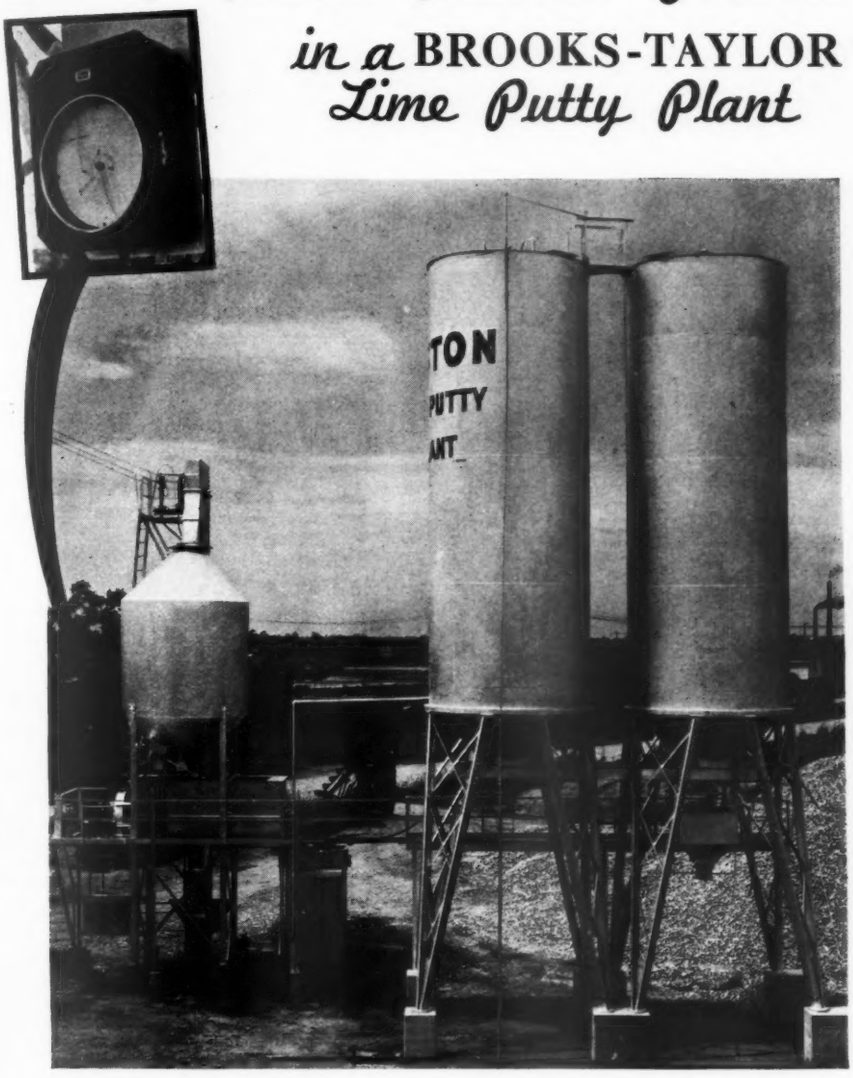
Elmer Pudliner is in charge of the stabilizing plant which operates with a crew of five men, with eight to 12 dump trucks carrying the finishing material off. W. E. Smith is superintendent of operations for Mr. Yerington.

Looking down the belt conveyor from atop the pug-mill.

Mr. Smith reports considerable satisfaction over the way the plant has been performing and the speed at which it can turn out the material, meeting the makers claim of 2 cu. yd. per min. He particularly mentioned the efficiency of the pug-mill, the accuracy with which the proportions of the different materials can be controlled and the uncanny ability of the screws and rolls to reject the stone from the clay.

Mr. Yerington also produces considerable sand and gravel, operating three Austin-Western No. 100 portable crushing-and-screening plants at various locations.

Slaked Under Thermal Control in a BROOKS-TAYLOR *Lime Putty Plant*



QUICKLIME is slaked under thermal control in a Brooks-Taylor lime putty plant. The operator stands directly in front of the temperature recording chart shown above. The temperature is brought up quickly to a predetermined point, usually between 175 and 185 deg. Fahr., and maintained at that point until the batch is slaked.

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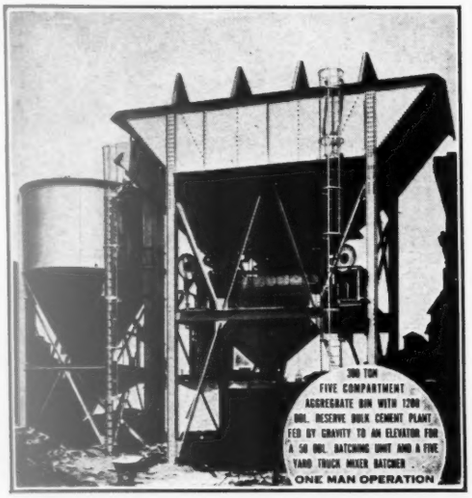
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- ☐ Engines, Hoisting
- ☐ Engines, Oil
- ☐ Feeders
- ☐ Filters, Air
- ☐ Filters, Oil
- ☐ Fire Brick
- ☐ Flanges, Pipe
- ☐ Frogs and Switches
- ☐ Fuses, Blasting
- ☐ Gears
- ☐ Goggles
- ☐ Governors
- ☐ Grinding Balls
- ☐ Grizzlies
- ☐ Guns, Hydraulic
- ☐ Hoists, Air
- ☐ Hoists, Derrick
- ☐ Hoists, Drum
- ☐ Hoists, Motor Truck Body
- ☐ Hoists, Skip
- ☐ Hose, Air, Stream, Water
- ☐ Hose, Sand Suction
- ☐ Hydrators
- ☐ Kettles, Calcining
- ☐ Kilns, Rotary
- ☐ Kilns, Vertical
- ☐ Lime Putty Plants
- ☐ Linings, Kiln
- ☐ Loaders, Portable
- ☐ Loaders and Unloaders Box Car
- ☐ Locomotives, Diesel
- ☐ Locomotives, Gasoline
- ☐ Locomotives, Steam
- ☐ Log Washers
- ☐ Lubricants
- ☐ Measuring Devices
- ☐ Mills, Compartment
- ☐ Mills, Tube
- ☐ Mixers, Plaster
- ☐ Motors, Electric
- ☐ Motors, Gasoline
- ☐ Motor Trucks
- ☐ Motor Trucks, Ready-Mixed Concrete
- ☐ Nozzles, Hydraulic Mining
- ☐ Nozzles, Gravel Washing
- ☐ Nozzles, Spray
- ☐ Nozzles, Dust Settling
- ☐ Nozzles, Suction Hose
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- ☐ Poidometers
- ☐ Pulleys, Clutch
- ☐ Pulleys, Magnetic
- ☐ Pulverized Fuel Systems
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- ☐ Pulverizers, Disc
- ☐ Pulverizers, Hammer
- ☐ Pulverizers, Ring
- ☐ Pulverizers, Rod
- ☐ Pulverizers, Roll
- ☐ Pumps, Centrifugal
- ☐ Pumps, Deep Well
- ☐ Pumps, Sand and Gravel
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- ☐ Safety Appliances
- ☐ Sand-Lime-Brick Machinery
- ☐ Scales, Track
- ☐ Scales, Truck
- ☐ Scrapers, Dragline
- ☐ Screens, Revolving
- ☐ Screens, Shaking
- ☐ Screens, Vibrating
- ☐ Separators, Air
- ☐ Separators, Dry Centrifugal
- ☐ Separators, Magnetic
- ☐ Shovels, Gasoline
- ☐ Shovels, Steam
- ☐ Skips
- ☐ Sleeves, Dredge
- ☐ Slugs and Nuggets, Grinding
- ☐ Speed Reducers and Gears
- ☐ Spray Nozzles
- ☐ Sprays, Paint
- ☐ Sprockets
- ☐ Steel, Tool
- ☐ Stokers
- ☐ Switches, Track
- ☐ Tanks, Concrete and Steel
- ☐ Tanks, Sand Settling
- ☐ Tanks, Wood
- ☐ Thickeners, Slurry
- ☐ Track, Portable
- ☐ Track Shifters
- ☐ Tractors, Crawler
- ☐ Tramways, Aerial
- ☐ Trippers, Belt
- ☐ Trippers, Tramway
- ☐ Unloaders
- ☐ Valves, Pump
- ☐ Washers and Scrubbers, Sand, Gravel, Stone
- ☐ Weighers, Automatic
- ☐ Welding Supplies
- ☐ Wheels, Car
- ☐ Winches
- ☐ Wire Cloth
- ☐ Wire Cloth, Manganese Steel

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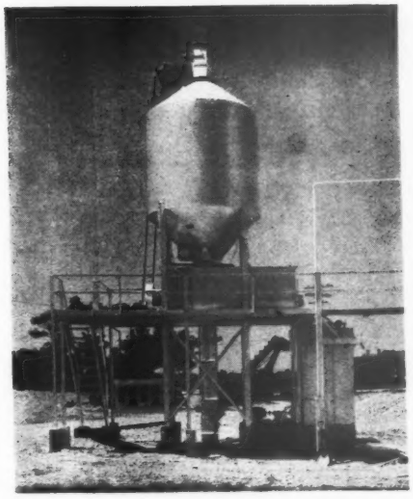
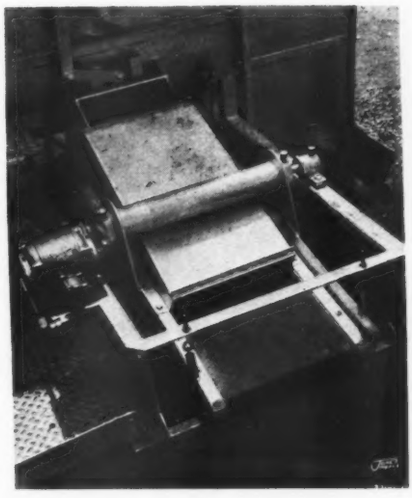
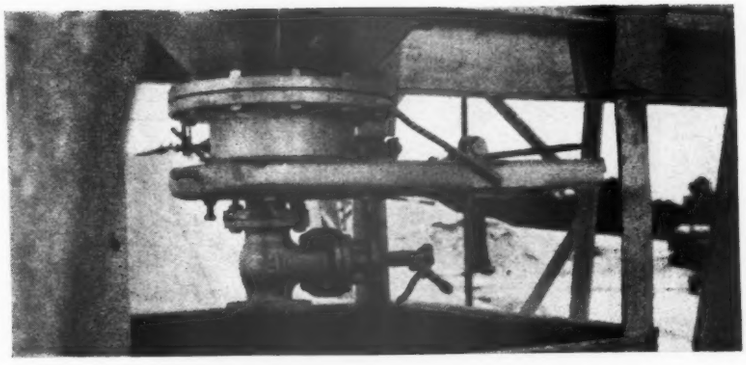
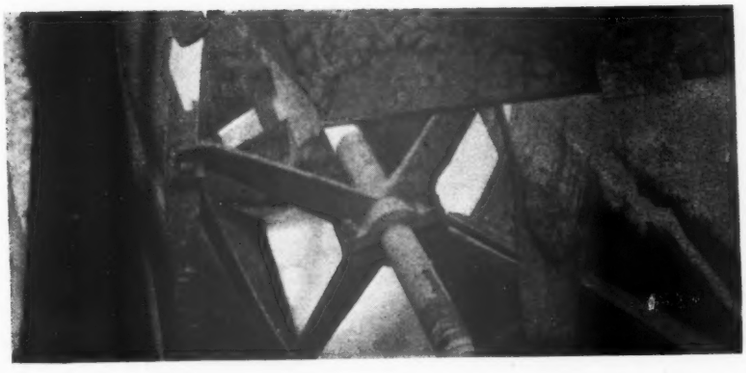
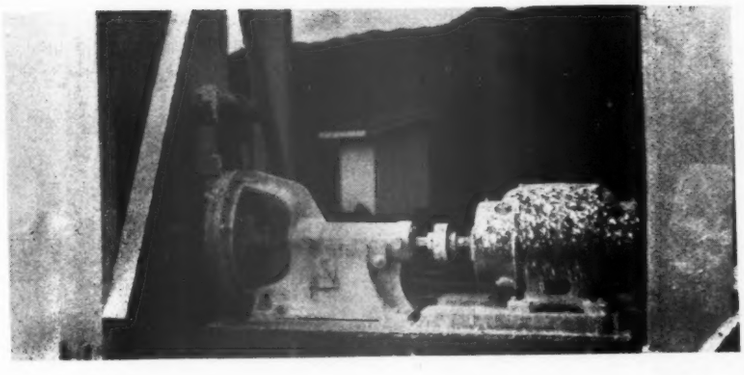


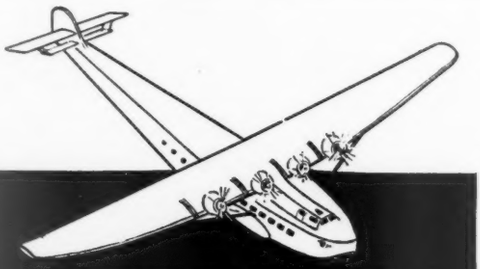
Views at the new lime-putty plant of the State Sand & Gravel Co., Indianapolis, Ind., are shown here (see story in news section). LEFT, reading down—lime-putty preparation plant; valve controlling discharge to batching hopper; revolving blade in slaker with lime hopper discharge above it; motor-driven pump which forces putty into storage tank. RIGHT, reading down—vibrating screen which removes lumps from milk-of-lime; temperature indicator for controlling putty consistency; dumping lime into elevator for raising to lime-storage tank.











STEARNS CLIPPER STRIPPER

A new self-contained stripper block machine producing up to four blocks per minute. A production outfit offered at the lowest price ever placed on comparable equipment.

Available in several combinations, with a degree of power operation to fit any requirement.

The Clipper Stripper has a low center of gravity, requires low head room. Rubber crank arm rollers assure quiet operation.

Ask for folder describing all five different models.

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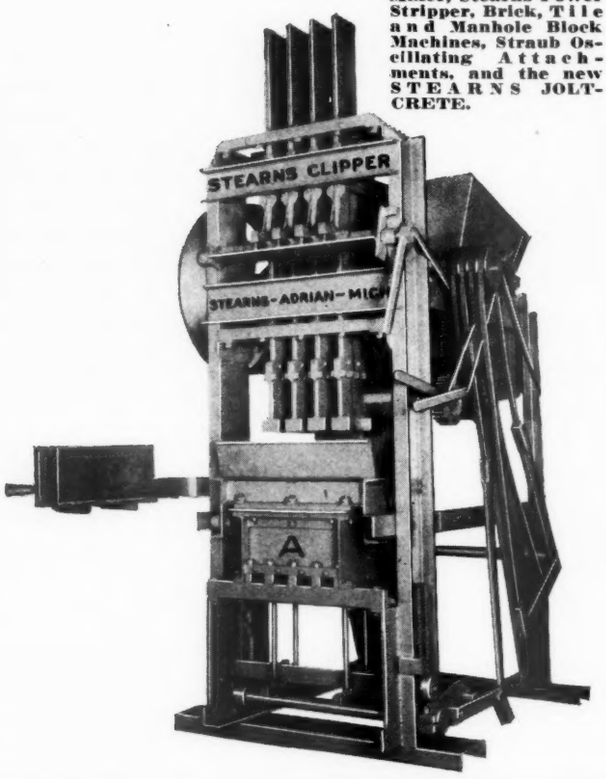
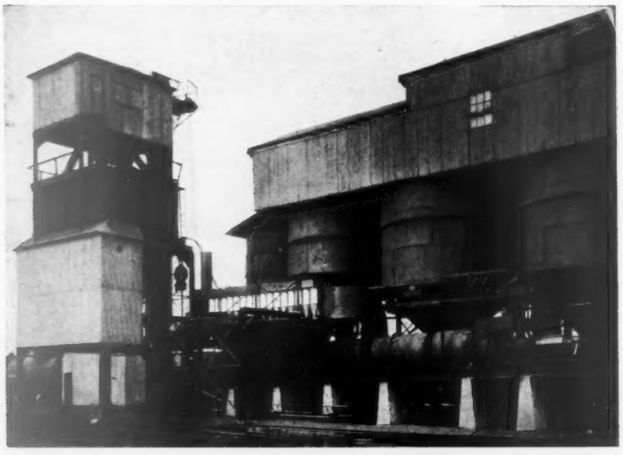
ALSO—

We manufacture the well known Stearns Mixer, Stearns Power Stripper, Brick, Tile and Manhole Block Machines, Straub Oscillating Attachments, and the new STEARNS JOLTCRETE.





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COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

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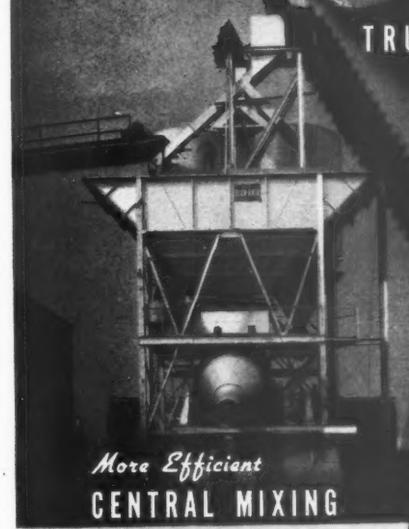
fights your battle for 1938 profits

Better TRUCK MIXERS



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Complete BULK CEMENT TRUCK MIXER LOADING PLANTS

★ A Blaw-Knox engineer will lay out a new and economical ready mixed concrete plant for you, or, he will tell you what is necessary to modernize your present plant for profitable operation—either through rearrangement of your present equipment or the addition of new Blaw-Knox Bins, Batchers, Truk-mixers or Agitators.

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OPPORTUNITY COMPLETE, READY-MADE FOR YOU IN YOUR LOCALITY—One that is proven—ready for you to cash in on the great building upturn under way. It includes the essentials upon which sound and successful business enterprises are established.

SUPERIOR PRODUCT, LOW COST PRODUCTION—You will produce a material nearly 20% lighter in weight—A product capable of meeting all known building requirements—One accepted by Government and City Building Departments—Requiring 20% less material—Made by line production machines.

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WE EQUIP YOU WITH LINE PRODUCTION MACHINERY—Large Production—only one or two men. Equipment costs but fraction of other processes of equal capacity. Franchise granted covering your locality—protecting your market, business and future.

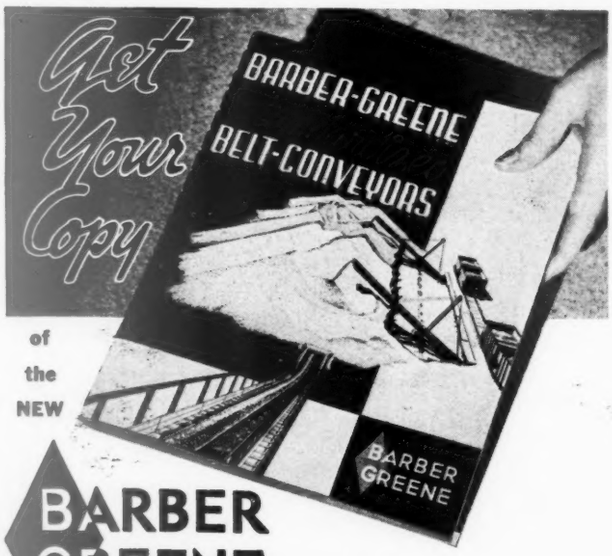
INVESTIGATE NOW—Send for "4 Keys to Success." It tells the complete story—How present manufacturers are making outstanding progress in this new industry—One that offers unlimited opportunity for growth, expansion and profit. Write today.

BETTER MATERIAL AT LOWER COST

Countless numbers of new homes, apartments and structures for business and industrial purposes are needed today. Government, industry, business, financial institutions and municipalities — all are combining to speed up this needed construction. They actually are paving the way and assuring a market for the man equipped to supply the enormous demand in his territory for building materials.

Your product will be permanent, fire and termite proof—in a full range of beautiful colors, shades and textures. Improved design cuts construction costs to the level of frame—and with factory-to-job delivery, offers new standard of service to building trade in your community.

W. E. DUNN MFG. CO. 420 W. 24TH ST., HOLLAND, MICHIGAN



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Barber-Greene Company, Aurora, Illinois—Gentlemen: Send me without cost or obligation your new 116-page Belt Conveyor Catalog and Manual that not only shows the complete line of B-G *Standardized* Belt Conveyors, but has 20 pages devoted entirely to Engineering Data.

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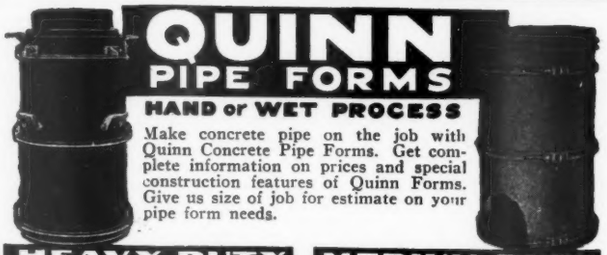

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HAND or WET PROCESS

Make concrete pipe on the job with Quinn Concrete Pipe Forms. Get complete information on prices and special construction features of Quinn Forms. Give us size of job for estimate on your pipe form needs.

HEAVY DUTY

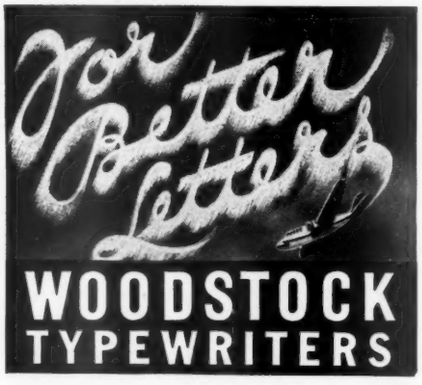
Built for more years of service—sizes for any diameter pipe from 12 to 84 inches—any length—tongue and groove or bell end.

MEDIUM DUTY

Makes same sizes pipe as "Heavy Duty" but built to meet demand for lower cost equipment to produce uniform quality in smaller amounts.

Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12 St. Boone, Iowa



JAEGERS GIVE YOU *a recognized advantage*

. . . . a Higher Strength, More Workable Concrete, Preferred by Engineers and Contractors . . .

Plus the Most Efficient, Low Cost Mechanism Yet Developed for Transit Mixing and Delivery . .

More concrete is sold by Jaeger Truck Mixers than by any other method—approximately $30,000,000 worth last year —and the demand KEEPS ON GROWING.

Here is one business that offers opportunity—to make a better profit than you could ever earn by selling bulk materials, to expand your present sales of "ready-mixed," or to establish a new business with the advantage of known quality in your product and greater efficiency in your operating equipment.

Write today for our new Specification TM-37, giving data of essential importance to present and prospective operators of ready-mix plants.

THE JAEGER MACHINE COMPANY
602 Dublin Avenue Columbus, Ohio

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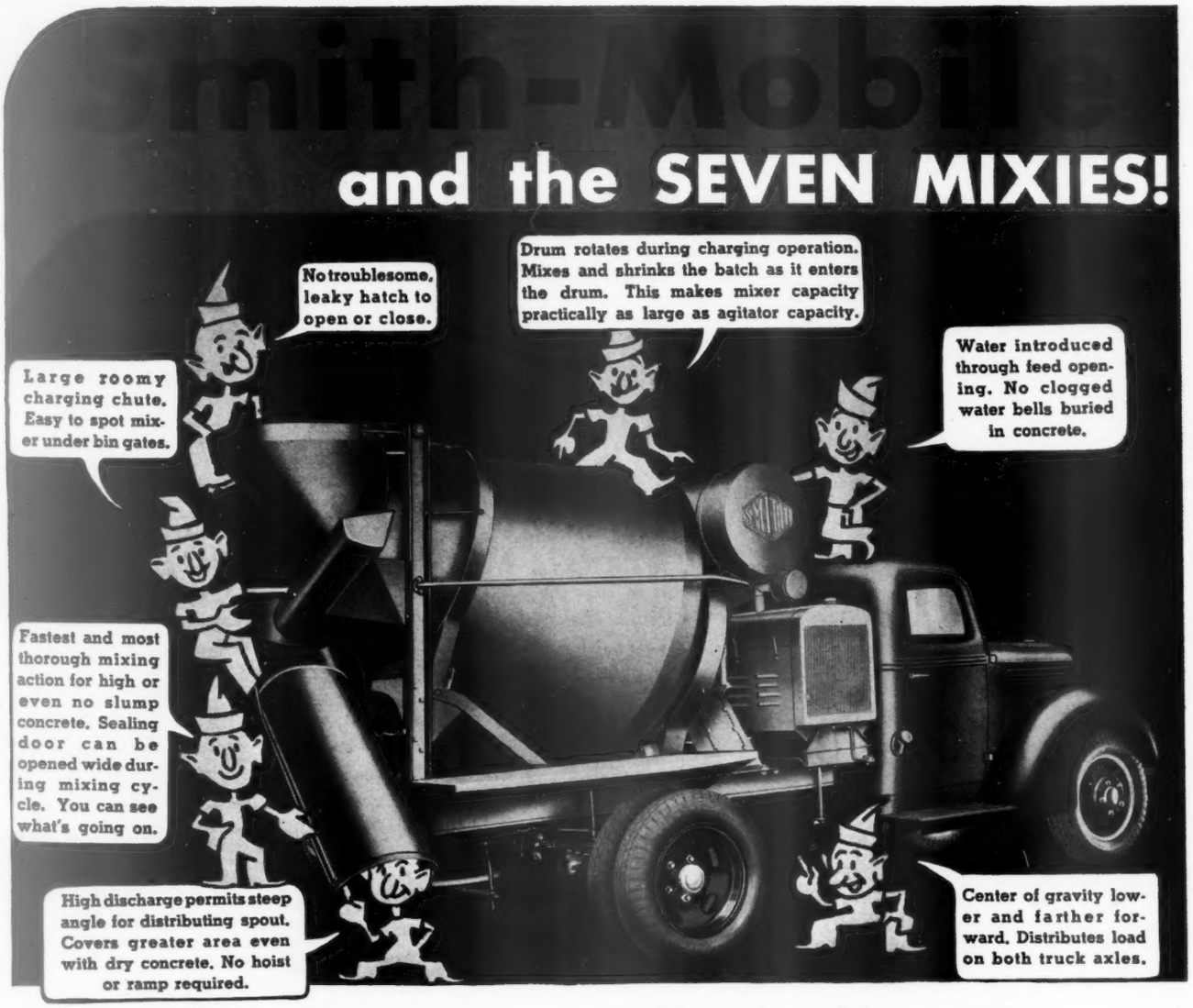
Smith-Mobile and the SEVEN MIXIES!


No troublesome, leaky hatch to open or close.
Drum rotates during charging operation. Mixes and shrinks the batch as it enters the drum. This makes mixer capacity practically as large as agitator capacity.
Water introduced through feed opening. No clogged water bells buried in concrete.
Large roomy charging chute. Easy to spot mixer under bin gates.
Fastest and most thorough mixing action for high or even no slump concrete. Sealing door can be opened wide during mixing cycle. You can see what's going on.
High discharge permits steep angle for distributing spout. Covers greater area even with dry concrete. No hoist or ramp required.
Center of gravity lower and farther forward. Distributes load on both truck axles.

It's New! *It's Different!*

YEARS AHEAD IN TRUCK MIXER DESIGN

If it's PROFITS you're after — BIGGER PROFITS — then you'll be interested in the new SMITH-MOBILE with the SEVEN MIXIES—acclaimed the fastest, most modern, most practical truck mixer and agitator on the market.

This new machine has turned out to be the sensation of the industry. Engineers and central mix operators everywhere have described the SMITH-MOBILE as the solution of their mixer problems. Enthusiastic endorsements are being backed up by real orders.

The SEVEN MIXIES, shown above, represent EXCLUSIVE SMITH FEATURES. No wonder this new machine has been so universally acclaimed. Altho new in principle, the SMITH-MOBILE has been thoroly field-tested. Built and guaranteed by SMITH — specialists in the manufacture of concrete mixers for more than 38 years . . . Before you buy your next truck mixer, be sure to investigate SMITH-MOBILE.

Write now for new bulletin!

THE T. L. SMITH COMPANY
2887 N. 32nd STREET MILWAUKEE, WISCONSIN

SMITH MIXERS

THE BOULDER DAM MIXERS

THE USE AND CARE OF RESPIRATORS

A SERIES of informative bulletins on practical engineering measures for combating occupational disease is being issued by the Air Hygiene Foundation, a non-profit organization for the advancement of industrial health. The second of the series deals with *The Use and Care of Respirators.*

The bulletins are being prepared by members of the foundation's Preventive Engineering Committee and other specialists. Prof. Philip Drinker, Harvard School of Public Health, is chairman of the committee. Other members are Warren A. Cook, Chicago; J. M. DallaValle, Washington; T. F. Hatch, New York; H. M. Nichols, Hyde Park, Mass.; S. C. Vessy, Cleveland; and W. P. Yant, Pittsburgh.

The bulletin on respirators points out that the most important use of "respiratory protective devices" is under working conditions "where protection is required intermittently, as in cleaning-out operations, sweeping, after blasting, in removing cores from large foundry castings, shoveling, screening and handling of materials, and the operation and maintenance of processing equipment."

The term "respirators" or "respiratory protective devices", says the bulletin, refers to a large and varied group of protectors worn on the face or over the head of the worker and designed to decrease or eliminate the amount of contaminant (dusts, fumes, mists, gases or vapors) in the inspired air. One type of respirator—the filter type—protects the wearer by filtering out some of or all the harmful material from the inspired air and a second type—the supplied-air respirator—protects by supplying clean air from a convenient source.

Respirators are not a substitute for general dust or gas control, but are a helpful adjunct. They are used extensively on such jobs as abrasive blasting, plant chipping, handling used storage-battery plates, cadmium-oxide manufacture, welding operations, spraying of paints and glazes, the manufacture and use of pigments and dyes, and the like. Their most important use is under conditions where protection is required intermittently as in cleaning out operations, sweeping, after blasting, in removing cores from large foundry castings, shoveling, screening and handling of materials, and the operation and maintenance of processing equipment.

Respirators should not be considered part of the worker's apparel. They are safety devices and should be supplied by the employer. The employer's duty does not stop with the purchase of respirators. He must see that they are distributed to all employees who need them. The workers must be told when to use respirators. They must be educated in their proper use—a difficult task which is accomplished only by incessant instruction.

Compared to other methods of dust and fume control, respirators are inexpensive. Consequently, little or no thought is sometimes given to their maintenance. Only too frequently good respirators are purchased, distributed carefully, and then forgotten. In a short time they are very dirty and function ineffectively, if at all.

It is important that respirators be maintained in good working condition. Any respirator which is not properly kept will soon become very dirty and ineffective. The worker will object to wearing a dirty or unsightly respirator. Furthermore, if the respirator is not properly maintained, it will soon become defective and will not afford the necessary protection, even if worn correctly and continuously. A defective respirator is worse than none because the wearer is given a false feeling of security, and will not take the precaution which he would take if he had no respirator.

There are two general systems of respirator maintenance to-day. They are: (1) individual maintenance, and (2) central maintenance. In the individual-maintenance system the care and upkeep of the respirator is left to the user. He is supposed to wash, sterilize and repair it. In the central-maintenance system all the respirators are assembled at one central point for cleaning and repairing.

Usually the central-maintenance system is worked out somewhat as follows. Each worker who needs respiratory protection is supplied with two respirators. These are marked with the employment number of the user. Respirators may be marked by stamping the number on the metal parts; riveting metal number plates on the rubber masks; or sewing laundry tabs on the headbands. When he goes to work in the morning, the worker passes by a row of pigeon holes in one of which, indicated by his employment number, he finds a clean and well-kept respirator. At the close of the shift, he places the dirty respirator in the pigeon hole. All the dirty respirators are collected by one man who cleans and repairs them in a room laid out for this purpose. One respirator per worker is sufficient, if the maintenance is carried out between shifts. Usually, however, two respirators are supplied and the repairing and cleaning are done by one man on the regular shift. The worker in charge of the respirator maintenance need not be a new or special worker. It may be the man in charge of the stock room, or any individual whose work will enable him to do it. Frequently the maintenance of respirators can be combined with that of other protective equipment, such as goggles and protective hats. In some industries, where relatively few respirators are in use, the maintenance is one of the duties of the nurse.

The advantages of the central over the individual system are obvious. Each worker has a clean, well-kept respirator daily. He will object less to wearing it, and will get real protection at all times. The monetary saving effected by the increased life of the parts and the decreased need for new respirators will usually more than offset the additional cost (if any) of setting up and maintaining the central system.

The idea of a central-maintenance bureau is not a new one. Such bureaus have been in use in a score or more industries for several years. The results produced, as evidenced by the condition of respirators and the apparent satisfaction of the users, are remarkable.

Respirator maintenance usually consists of cleaning, sterilizing and repairing. Effective methods of cleaning and sterilizing are as follows:

Cleaning:

Wash with a brush and soap in warm water.

Sterilizing:

(1) Immerse for 10 min. in a solution of formalin made by placing 1 part of 40-per cent. formaldehyde solution into nine parts of water.

(2) Dip in a 3-per cent. solution of carbolic acid, a 2-per cent. solution of lysol, or a 70-per cent. solution of denatured alcohol.

(3) Subjecting the respirator to sterilization by a moist atmosphere of antiseptic gas, preferably for-

Light in weight, comfortable and compact, the new Willson "rotiform" respirator is approved by the U. S. Bureau of Mines for protection against Type A dusts such as silica-quartz, asbestos, aluminum, iron ores, etc., produced in the process of grinding, mining, quarrying; and in industrial operations of grinding, crushing and general processing of materials. (Willson Products, Inc., Reading, Pa.)

maldehyde, for a period of 10 min. at room temperature.

After following any one of the outlined procedures, the respirator should be rinsed with water and hung up to dry. The filters, felt screens and head bands, if elastic, must be removed before cleaning or sterilizing the respirator.

Many dust respirators employ so-called "long-life" filters, which are intended to be used again and again. Such filters are cleaned by blowing out the dirt or dust with compressed air; by brushing the surface; or by tapping the filter. If the filters are moist, they must be dried before the dust can be removed effectively. To remove grease and the like, the filters may be dipped in a dry-cleaning solution for a very short time. This process should be carried out only infrequently, because it decreases the life of the filter.

One of the three Cesco Healthguard respirators approved by the U. S. Bureau of Mines for use in Type A dusts. This model, No. 92, is the newest to receive this approval. Filter units are of unique construction, having an effective breathing area of more than 45 sq. in. The headband is of molded gum rubber which has extremely long life. Face cushions are anatomically shaped, conform to facial contours and seal tightly without perceptible pressure. (Chicago Eye Shield Co., Chicago.)

At the present time there are two schedules under which the Pittsburgh Experiment Station of the U. S. Bureau of Mines tests filter (dust, fume or mist) respirators and supplied-air respirators (hose masks, air-line respirators, abrasive blasting helmets) for effectiveness. These schedules are as follows:

No. 21 (1934)—*Procedure for Testing Filter-Type Dust, Fume, and Mist Respirators for Permissibility.*

No. 19A (1937)—*Procedure for Testing Supplied-Air Respirators for Permissibility.*

Both these schedules were put into effect after the bureau had examined the needs of industry with great care and circulated the proposed schedules among interested persons. Details of the testing methods are described fully in the schedules, which are obtainable through the Government Printing Office. The result has been that the various state agencies, insurance companies, mining and manufacturing establishments are likely to advise the use only of the Bureau of Mines approved devices on jobs with a recognized dust or fume risk.

At this writing the following makes and types of respiratory protective devices have Bureau of Mines approval:

Gas Masks

Vapors, Carbon Monoxide, Ammonia, Smokes, Dusts, and Mists.

1. All-Service gas mask. Approval No. 1403, issued to Mine Safety Appliances Co., Braddock and Meade Sts., Pittsburgh, Pa., July 1, 1925.
2. All-Service gas mask. Approval No. 1405, issued to Mine Safety Appliances Co., August 24, 1928.
3. All-Service gas mask. Approval No. 1405, issued to B. F. McDonald Co., 1248 South Hope Street, Los Angeles, Cal., October 2, 1937.

Mechanical-Filter Dust, Fume, and Mist Respirators

(Approved under Schedule 21.)

Type A Mechanical-Filter Respirators: *For Protection Against Pneumoconiosis-Producing or Nuisance Dusts, as Quartz, Asbestos, Iron Ores, Cement, Limestone, Gypsum, Coal, Coke, Charcoal, Wood, Cellulose, Flour and Aluminum.*

1. M. S. A. Comfo Respirator. Approval No. 2101, issued to Mine Safety Appliances Co., January 7, 1935.
2. Willson Bag Respirator No. 300. Approval No. 2102, issued to Willson Products, Inc., Reading, Pa., January 21, 1935.
3. Willson Bag Respirator No. 400. Approval No. 2103, issued to Willson Products, Inc., January 21, 1935.
4. Pulmosan M-15 Pouch-Type Filter Respirator. Approval No. 2104, issued to Pulmosan Safety Equipment Corp., 176 Johnson St., Brooklyn, N. Y., February 9, 1935.
5. Biever Respirator. Approval No. 2105, issued to Standard Safety Equipment Co., 75 East Wacker Drive, Chicago, Ill., March 5, 1935.
6. Willson Bag Respirator No. 4. Approval No. 2106, issued to Willson Products, Inc., May 27, 1935.
7. Pulmosan M-11 Pouch-Type Filter Respirator. Approval No. 2109, issued to Pulmosan Safety Equipment Corp., March 23, 1936.
8. No. 24 Dupor Respirator. Approval No. 2111, issued to H. S. Cover, Station A, South Bend, Ind., September 15, 1936.
9. Cesco No. 90 Healthguard Respirator. Approval No. 2113, issued to the Chicago Eye Shield Co., 2300 Warren Blvd., Chicago, Ill., December 16, 1936.
10. Cesco No. 91 Healthguard Respirator. Approval No. 2114. Issued to the Chicago Eye Shield Co., August 6, 1937.
11. McDonald Dustfoe Respirator. Approval No. 2115, issue to the B. F. McDonald Co., Los Angeles, Cal., October 8, 1937.
12. Dustfoe Respirator. Extension of Approval No. 2115, issued to Mine Safety Appliances Co., November 23, 1937.
13. Cesco No. 92 Healthguard Respirator. Approval No. 2116. Issued to Chicago Eye Shield Co., November 8, 1937.
14. Willson Bag Respirator No. 100. Approval No. 2117, issued to Willson Products, Inc., December 27, 1937.
15. Willson Rotiform Respirator No. 200. Approval No. 2118, issued to Willson Products, Inc., December 30, 1937.
16. Willson Respirator No. 750. Approval No. 2119, issue to Willson Products, Inc., January 3, 1938. The use of felt screens with paper filters is optional.
17. Pulmosan D-4100 Duo-Filter Respirator. Approval No. 2120, issued to Pulmosan Safety Equipment Corp., January 12, 1938.
18. American Optical Co. R 1000 Respirator. Approval No. 2121, issued to American Optical Co., Southbridge, Mass., February 3, 1938.

Type A respirators are not approved for protection against poisoning by breathing dusts whose main harmful constituents are metals or their compounds, such as antimony, arsenic, cadmium, chromium, lead, manganese, mercury, selenium, tellurium, thallium, uranium, and vanadium; or protection against harmful smokes and fumes. Respirators for protection against these forms of particulate matter require special approval.

R 1000 respirator (American Optical Co.)

Cliffe (from page 81)

should simplify the cares of the plant analyst. Instead of the old dread which accompanied each examination of the graduate, he knows his routine procedure will show a state almost identical to its predecessor; with such constant conditions how can it be otherwise?

Last, but not least, the salesman knows when he promises to ship a discriminating buyer a given analysis that he can do so with full measure of confidence that on his next visit he will still have a friend who will be glad to see him. What sales representative who has handled lime can read that statement without full appreciation?

It is not to be taken from these brief remarks that all new rotary-kiln lime plants are so complete and flexible, but the fact that there are examples as herein described is ample indication of the possibilities of careful planning with emphasis on control.

New Method to Show Anhydride Content

A new pravimetric method for the determination of phosphoric anhydride (P_2O_5) in phosphate rock, superphosphate, and similar materials without the usual preliminary precipitation as yellow ammonium phosphomolybdate has been devised by Hoffman and Lundell of the National Bureau of Standards. It is not sufficiently rapid to replace the usual volumetric method now employed in routine analysis, but it is recommended for use in standardization and umpire analyses of phosphate rock and similar materials, and its application to the analysis of liquids used with silicate cements in dentistry has also been demonstrated. Very accurate results are obtained. Iron, aluminum, titanium, silica, calcium, zinc, manganese, fluorine, and organic matter in the percentages found in phosphate rock do not interfere. Sulphates and nitrates, which might be introduced in the manufacture and mixing of fertilizers, likewise do not interfere.

Three methods are suggested for getting the phosphatic material into solutions, only one of which is likewise applicable to "metaphosphate." Two of these use HC_1 and HNO_3; HF and HNO_3 are used with the "metaphosphate."

Ammonium citrate, HC_1, and a magnesia mixture are added to the solution, being followed by an excess of NH_4OH. This solution is diluted, shaken, and, after standing overnight, filtered. The filtrate is discarded. Dilute HC_1 is used to dissolve the magnesium ammonium phosphate formed. A little citric acid and magnesium mixture is added, and, after being made alkaline by NH_4OH, the solution is allowed to stand at least 4 hours. The precipitate is collected on filter paper, washed with dilute NH_4OH, and transferred to a platinum or porcelain crucible and ignited to constant weight. The weight of the magnesium pyrophosphate, $Mg_2P_2O_7$, multiplied by 63.79 and divided by the weight of the sample, gives the percentage of P_2O_5 in the sample.

Mica Industries Very Active in Past Year

Mica-consuming industries in the United States were never more active than during the early months of 1937, and their pace slackened slowly until late in the year when demand from the radio, electrical appliance, and automobile industries almost ceased. Notwithstanding the recession in demand during the latter half of the year, the consumption of mica splittings and of ground mica as reported to the Bureau of Mines jumped to all-time records and more sheet mica, both foreign and domestic, was sold in this country in 1937 than in any previous year since 1930. Abroad there was no slackening until the end of the year; Europe continued to take all mica it could get and at ever-rising prices, and Japan bought extraordinary quantities of the better grades of mica.

The total production of uncut sheet mica and scrap in the United States rose in 1937 to 26,043 short tons valued at $639,981 compared with 21,615 tons valued at $464,473 in 1936. Imports totalled 11,339 tons nominally valued, even on a foreign market basis, at $2,067,599; imports in 1936 aggregated 6,677 tons with a declared valuation of $1,205,568. The foregoing figures for domestic and imported mica respectively represent tonnage ratios of 2.3 to 1 in 1937 and 3.2 to 1 in 1936, but these ratios are misleading. Actually the United States produces normally only 15 to 35 per cent. of its requirements of sheet mica larger than about 1½ by 2 in., and less than 5 per cent. of its requirements of splittings. The bulk of the domestic production is scrap, ground mica schist, and by-product mica, although American mines also produce almost enough punch and circle mica—used for making washers and small radio stampings—to meet domestic needs.

Fullers' Earth Output Continues to Lag

Consumption of fullers' earth and natural bleaching clays, in the United States declined slightly in 1937, notwithstanding further expansion in oil refining to an all time record. Domestic production of fullers' earth, as reported by the Bureau of Mines, was 226,165 short tons valued at $2,296,094 in 1937 compared with 230,814 tons worth $2,264,978 in 1936. The increase in average value to $10.15 from $9.81 in 1936 tends to confirm the trend toward using smaller quantities of higher-grade earth. More important is the expanded use of artificial activated earths, made mostly from bentonites, and of acid-sprayed earths, such as are produced especially in Texas. These high priced but more efficient bleaching earths have invaded the market for raw fullers' earth as have new methods of oil refining wherein part of the bleaching is accomplished by chemicals. About 90 per cent. of the consumption of fullers' earth is used for refining petroleum products and most of the remainder is used for bleaching and deodorizing vegetable oils and animal fats.

One of the Consolidated Rock Products Co., Los Angeles, Cal., Diesel-powered trucks about to leave the Irwindale plant for the Compton bunkers 20 miles away. The company operates six trucks powered with 6-cyl., 150-hp. Cummins Diesel engines and reports this type of equipment has reduced fuel bills enormously.

WALTER W. DUFF
President and General Manager,
New Castle Lime & Stone Co.,
New Castle, Pa.

MEN · OF · THE · INDUSTRY

After receiving his degree in civil engineering at Bucknell University in 1911, Mr. Duff went to work for the Pennsylvania Highway Dept. Two years later he became quarry superintendent at Hillsville, Pa., for the Union Limestone Co. In 1919 he rose to general superintendent of both the Union Company and Lake Erie Limestone Co. During 1917 and 1918 he helped organize the company he now heads, serving as vice-president and general manager until January of this year when he became president and general manager. He has served three terms as president of the Pennsylvania Crushed Stone Assn. and has been active in the affairs of the national association. He is 50 years old and a Hillsville native.

Personal Mention

JOHN NORVIG, formerly general superintendent at Hudson, N. Y., for the Lone Star Cement Corp. has been appointed general superintendent of all plants of the Pennsylvania-Dixie Cement Corp.

FRANK L. CHRISTY has been elected president of the Marietta Concrete Corp., Marietta, O., succeeding Harry Heiby. The latter resigned to be associated with the Great Lakes Portland Cement Co. at Buffalo, N. Y. Mr. Christy has been associated with the company since its organization in 1915.

S. E. MEWHIRTER, engineer doing advisory work for the Compania de Cementos Portland Diamante of Bogota, Colombia, in connection with its new cement plant, was in Texas for a short visit during May. While at San Antonio, Mr. Mewhirter purchased a new automobile for shipment to Colombia. He recently returned from the U.S.S.R., where for 3½ years he served as a consulting mining engineer for the Soviet Government.

NATHAN HANNAFORD, who has been engaged in the sand-and-gravel business in West Des Moines, Ia., has begun the manufacture of concrete blocks, under the firm name of the Des Moines Concrete Products Co.

A. C. Howard has been appointed general manager of the Beloit, Wis., plant of Fairbanks, Morse & Co. Mr. Howard has been assistant general manager of the Beloit plant for six years.

HARRY J. CASEY has been elected president of the Henry H. Meyer Co., construction and industrial equipment, Baltimore, Md., succeeding the late John A. McDivit.

EARLE V. DRAPER, manager of the Globe, Ariz., workings of the Emsco Asbestos Corp., described the mining and processing of asbestos to the Globe Rotary Club at a recent luncheon meeting.

G. V. WOOD, formerly associated with Taylor-Wharton on the Pacific Coast, is returning to this country from England to become Pacific Coast Manager at San Francisco, according to an announcement by the Taylor-Wharton Iron & Steel Co., Easton, Pa. For the past three and a half years, Mr. Wood has been managing director of Alluvial Dredges, Ltd., London, England.

H. D. HUMPHRIES, formerly district engineer at the Richmond, Va., office of the Portland Cement Assn. has been appointed district engineer in charge of the association's office at Atlanta, Ga.

J. P. MCNULTY of Pine Bluff, Ark., has acquired the Lincoln Gravel Co. and is adding new equipment to the plant located near Star City, Ark.

M. O. MATTHEWS, general manager of the Oklahoma Portland Cement Co. addressed the convention of the Oklahoma Assn. of Commercial Organization Secretaries held recently at Okmulgee, Okla.

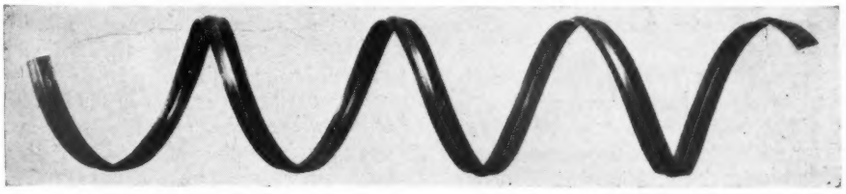
L. L. ALLER, 68, president of the Ohio Sand & Gravel Co., Columbus, O., died recently at his home. He had been engaged in aggregates production and road building for more than a quarter century. Burial was at Larue, O.

JOHN F. DEELY, 74, president and general manager of the Lee Lime Corp., Lee, Mass., passed away recently. He founded the company, which now operates three plants, 40 years ago.

A. W. SCHMIDT, JR., 53, founder of the Standard Cement Block Co., Brooklyn, N. Y., died June 3. He was a former president of the Flatbush Chamber of Commerce.

GEORGE ZENZ, 53, shovel operator for the Michigan Limestone & Chemical Co., Rogers City, Mich., died of a fractured skull a few weeks ago when he was injured while at work in the quarry.

JOHN DOWNING, lime producer of Ontario, died recently at Beachville, Ont. He was born in England in 1848, founded the company which later became the Standard White Lime Co., of Beachville, and of which he was president at time of his death.



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Foreign Developments

Determination of Fuel Consumption in Kilns

The *Revue des Materiaux de Construction et de Travaux Publics,* No. 343, April, 1938, pp. 61-64, presents a comprehensive restatement of an article by M. E. O. Xhodoroff which appeared in Bulletin No. 1, 1937, of the Cement Institute of the U.S.S.R., Leningrad, on an analytical method of determining the consumption of fuel in cement kilns. The data for arriving at the solution of the problem are as follows:

1. The chemical analysis of the fuel blown in;
2. The nature (i.e., the quantities of $CaCO_3$ and $MgCO_3$ contained in the raw materials in the dry state) of the mixture of raw materials sent to the kiln, or the quantities of CaO and of MgO present in the clinker;
3. The analysis of the collected waste gases in the dry state. The calculations are set out in detail.

Working Concrete After Storage or Mixing

The traditional idea that concrete is particularly sensitive and must not be disturbed in the period between the two setting times, i.e., the initial hardening and the final set, has recently been challenged from several sources and has been contradicted by experiences with ready-mixed concrete transported in trucks, with pumped concrete and with the Holter road-building process. These practical results are confirmed by a laboratory study reported here.

These investigations have showed that cement can even be stored and worked beyond the normal setting time without injuring the cement's hardening capacity; the idea that a concrete is in a particularly sensitive condition during the setting and hardening, during which any disturbance causes a weakening of the capacity to harden, is therefore not tenable.

The time to which a concrete can be stored and then worked without any loss of strength is dependent on (1) the resistance of the concrete to deformation and (2) the capacity of the placing apparatus to yield dense concrete. Even though this appears contradictory to the prevailing ideas, it does not call for any change in the usual rules of concrete production because (1) no considerable increase of strength is yielded by storage, and (2) more work is required for placing a dense concrete after storage than in case of a fresh concrete, and (3) it may be necessary to add more water in placing a concrete after storage, thus diminishing strength through the increased water-cement ratio.

Investigations with mixing showed that concrete can be mixed before, during and even after the setting time of the cement; the strength of the concrete is increased and the density improved. The experiences in practice with truck-transported mixed concrete and pumped concrete and the Holter highway process, which are contrary to the older ideas, are thus verified by laboratory experiments. These investigations also indicate that the mixing may be prolonged not only for the purpose of handling concrete in large quantities, but also for the purpose of improving specific properties.—F. Keil and F. Gille in *Zement* 27: 113-117, 157-161, 171-173, March 3, 17 and 24, 1938.

Utilization of Waste Heat from Lime Kilns

In a lime plant in what was then Austria, before the War (now in Italy), the author employed the heat remaining in freshly burned lime to produce a combined material of gypsum and lime which was used for various construction purposes. The lime, hot from the kiln, and raw gypsum were placed together in layers, and the water driven off from the gypsum by the heat remaining in the lime served to hydrate the lime. The resulting material was white in color, setting time 45 minutes, and withstood the soundness test. After 7 days, stored in air, 1:3 standard sand test specimens tested 150 kg. per sq.cm. compressive strength; after 28 days, 210 kg. The material was used for the production of gypsum tiles and partitions.—Ludwig Mayer in *Tonindustrie-Zeitung* 62: 315-316, April 7, 1938.

Turbidimeter Test for Determining Fineness

For determining the fineness of grinding, the customary method in Germany is still the use of sieves, the fineness being determined according to the residue remaining on the determined sieves. A better method has been sought for a long time, but neither the air separation method (Gonell) not the sedimentation process, e.g., according to Kühl-Czernin or Andreasen, nor the rapid method of the latter developed by Haegermann, has been widely accepted in Germany. The author describes an improved Klein turbidimeter, which he recommends as a method for finding exactly and in a few minutes the specific surface of finely ground dry materials.—H. Elsner von Gronow in *Tonindustrie-Zeitung* 62: 361-365, April 25, 1938.

Studies of Analysis of Hardened Concrete

Nine specimens of hardened concretes were collected by the author and studied with a view to determining the proportions in which the component materials were mixed. The results show that when practically insoluble aggregates are present, the proportions of a concrete mix can be determined by three different methods—the residue insoluble in hydrochloric acid, and the quantities of soluble silica and calcium oxide—so that the process gains in dependability. The fine part of the aggregates affects the properties of the cementing material nor only because of its fineness but also through its chemical nature, which can no longer be left out of consideration.—E. Steopoe in *Tonindustrie-Zeitung* 62: 365-367, April 25, 1938.

Granular Composition and Concrete Density

Investigations show that the maximum density of all mortar and concrete mixes is reached when the sieve curves lie within a zone (shown graphically in the original) defined by definite formulae which apply to any size of aggregate. However, in addition to such mixes with straight-line sieve curves, there are many mixes with irregular curves which reach a density just as high, even though the sieve curve lies outside the zone previously defined, so that the minimum of voids is not dependent upon a straight-line course of the sieve curve. The density is, rather, dependent on the surface under the sieve curve, and the minimum of voids is attained when this surface under the sieve curve lies between 50 and 60 per cent. of the total surface of the graph. This regular relation of granular composition to density applies in any size of particle.—Georg Rothfuchs in *Zement* 27: 281-285, May 5, 1938.

David Oliver's Estate of Melbourne, Australia, has been licensed to build and operate Brooks-Taylor lime-putty plants in that country. The arrangements were completed during the recent National Lime Assn. convention in Cincinnati, which was attended by both E. L. Newbiggin, who represented the Australian firm, and W. Hayden Brooks of the Brooks-Taylor Co., Atlanta, Ga. Mr. Brooks' company owns the patents on the Brooks-Taylor process.

Traffic News Digest

Legislation

Unless Congress is called into an extra session the various bills dealing with railroads and traffic which were not enacted at the third session which closed in June will have to be reintroduced when the new Congress convenes. Looking back over the records of the recent session there was very little new traffic legislation enacted. Perhaps the most important item as far as the shipping public is concerned was not the enactment of a law, but the refusal to pass the 70-car train bill which would have greatly increased transportation costs. That legislation for relief of the railroads was advisable was made clear by Senator Wheeler, Chairman of the senate committee on Interstate Commerce at the beginning of the session. Later the President called a meeting of railroad men and Interstate Commerce Commissioners following the Commission decision in the general rate increase case. Following the meeting the President asked Chairman Splawn and Commissioners Eastman and Mahaffie to give him recommendations for immediate action by Congress in regard to the whole railroad situation which he said was critical. The recommendations made by the Commissioners together with other suggestions made at the previous meeting were sent to Congress on Apr. 11th. Some bills were introduced following the suggestions but there was no activity for passage until a short time before Congress adjourned. A railroad relief bill was introduced but when the railroad management gave formal notice of its intention to cut wages 15 per cent. on July 1st railroad labor withdrew its support from the relief bill and no action was taken on it. The status of various traffic bills at the close of Congress are as follows:

Land-Grant Rates—After having reported Senate bill 3,876, the bill to repeal land-grant rates, favorably by the Interstate Commerce Committee a request was made by Chairman Wheeler that the bill be recommitteed to the committee for further consideration. This request was granted. This action followed a talk with a member of the Attorney General's office calling attention to some parts of the bill which concerned the Department of Justice. The bill was not again reported to the Senate. Chairman Lea of the House Committee on Interstate and Foreign Commerce introduced, H.R. 10,620, a bill to repeal all land grant rates without exception. Hearings on this bill were begun on May 31 with witnesses being heard who were generally in favor of the bill as written. The hearing was adjourned June 2 and no action on the bill was taken by the Committee.

Postalization of Railroad Fares—The bill introduced by Representative Lemke of North Dakota directing the Commission to investigate and report on the plan to postalize passenger fares was not acted upon.

Fourth Section Revision—The Pettengill bill which would eliminate the long and short haul clause of the fourth section which had passed the House in both the 74th and 75th sessions of Congress and has been a live subject in the Senate for some time was not considered because a few senators indicated that they would conduct a filibuster if the bill was brought to the floor for consideration. A minority report from the Interstate Committee giving objections to the bill was filed in behalf of Senators Wheeler, Truman and Shipstead.

Wages and Hours—The wage-hour bill which was passed by Congress did not apply to employees of motor carriers or railroads subject to part one of the Interstate Commerce Act.

Train-Dispatcher Hours—Hearings on the House bill to limit the work day for train dispatchers to 6 hours were held before a subcommittee of the house committee on Interstate and Foreign Commerce but the sub-committee had made no report on the bill when Congress adjourned.

Railroad Reorganization—Representative Chandler's bill, H.R. 10,387, creating a commissioner of railroad reorganization and providing for consolidation of railroads was the subject of hearings begun June 1. Representatives of the Interstate Commerce Commission, investment bankers and economists were heard. At the adjournment Representative Chandler said that a study of the railroad situation would be continued through the summer months.

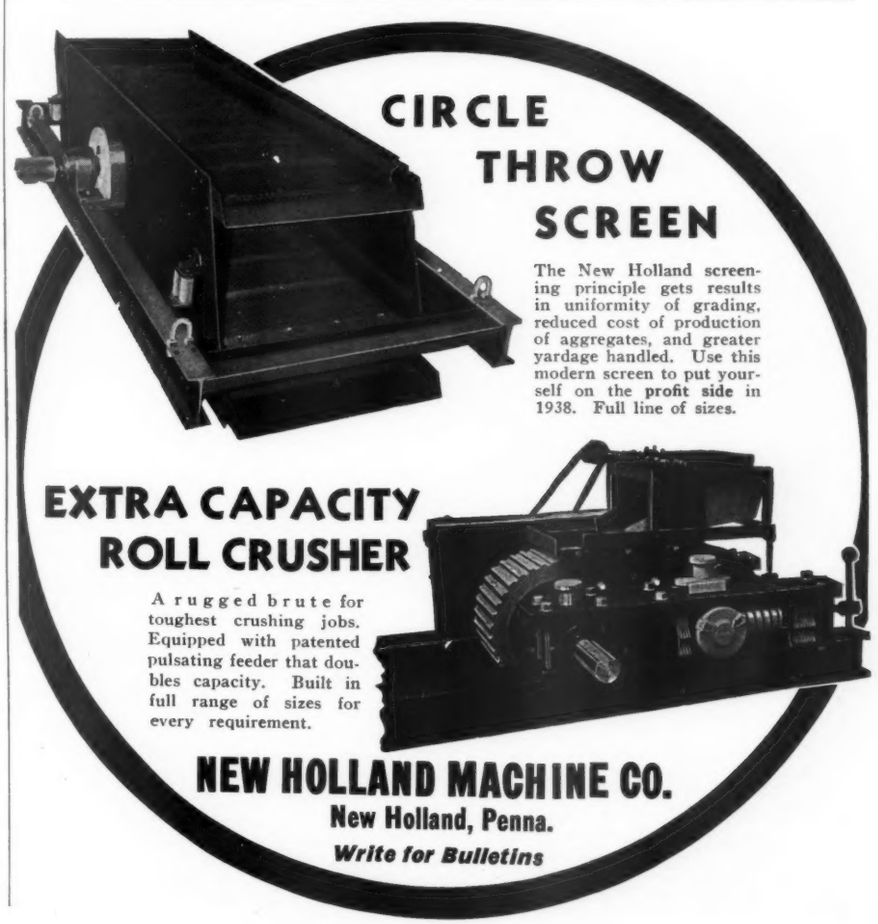
Recent I. C. C. Decisions

Cement—In response to fourth section application No. 16,880 the Commission has denied authority to the B. & A. and C. V. to establish and maintain rates on cement from Hudson and Hudson Upper, N. Y., to Burlington and Alburgh, Vt., and Rouses Point, N. Y., via their indirect route the same as applies over the direct route of the B. & A. and the Rutland from and to the same points. Although the proposed rates were prescribed in New England Cement Rates, 155 I. C. C. 601, for application over the direct route the Commission found that while such rates would be reasonable over the direct route they would not be reasonably compensatory and would result in wasteful transportation over the circuitous route covered in the application and found that the additional relief had not been justified. I. C. C., F. S. O. 13,104 Cement to Central Vermont Railway points.

Crushed Stone, Sand and Gravel—In the 13th section case covering rates on crushed stone, sand and gravel within the state of South Carolina the Commission has issued its 10th supplemental report allowing the carriers to reduce the intrastate rate on crushed stone and screenings from Columbia and Cayce, S. C., to Dixiana, S. C., and on sand from Johns Island, S. C., to Charleston, S. C., to meet truck and barge rates. I. C. C. Docket No. 22,109, rates on crushed stone, sand and gravel within the state of South Carolina.

Lime—In response to fourth section applications Nos. 17,150, 17,250 and 17,298 the Commission has granted relief from the long and short haul clause of the fourth section on lime and building mortar from trunk line territory to destinations in central territory. The rates prescribed are the same as those prescribed in I. C. C. Docket No. 16,170 applicable on a dual minima of 30,000 lb. and 50,000 lb. from points in Pennsylvania, New York, Virginia, Maryland, Vermont, West Virginia and New Jersey to destinations in central territory and Wisconsin. The relief is subject to the usual 33⅓, 50 and 70 per cent. circuity limitations. I. C. C., F. S. O. No. 13,110, lime from trunk line to central territory.

After further hearing the Commission has amended its report in 218 I. C. C. 131 allowing fourth section relief on lime to Mississippi River crossings; to allow carriers to establish and maintain rates on lime from points in the St. Louis and Hannibal, Mo., groups to New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Orleans and Baton Rouge without observing the long and short haul clause of section 4. Fourth section authority was denied from Johnson and Limedale, Ark., and points in the Springfield, Mo., to Memphis, Tenn., and Mississippi River crossings south thereof. Relief was also denied from Ditlinger, Houston, Lime City, MacNeal and Round Rock, Tex., to Baton Rouge and New Orleans. I. C. C. F. S. O. No. 12,447, Lime to lower Mississippi River crossings.

Sand—The Commission has awarded reparation of $163.23 with interest on finding that the rates on moulding sand from Mt. Holly, Millville, Cape May and Dorchester Pit, New Jersey, to Seneca Falls, N. Y., between Oct. 15 and Nov. 20, 1934 were unreasonable to the extent they exceeded $2.40 from Mt. Holly, $2.80 from Cape May and Millville and $3.00 per ton from Dorchester Pit. I. C. C. Docket No. 27,762 Gould's Pumps Inc. *v.* Lehigh Valley, *et al.*

Examiner's Report

Sand—Examiner Burton Fuller proposes that the Commission fine the rate on sand in box cars from Ottawa, Ill., to Thorold, Ontario, Canada, between November 29, 1935 and June 15, 1936 not unreasonable on a shipment which moved via Buffalo, N. Y., but unreasonable on the other shipments to the extent it exceeded $2.40 on a net ton. As this case involved a shipment between the United States and Canada the examiner pointed out that the Commission had no power to require the maintenance of joint rates between the United States and Canada but that if the carriers elected to maintain such rates that the Commission might find such rates unreasonable and require defendants operating in the United States to cease and desist from participating in such rates and to respond in damages to the shipper or consignees who paid for the charges. The examiner recommends that award of reparation in this case. I. C. C. Docket No. 27,915 Exelon Co. *v.* Belt Railway Co. of Chicago, *et al.*

New Complaints Filed

Crushed Stone—Four complaints involving the rates on crushed stone have been filed by Edwin Brooker, 5702 Colorado Ave., N. W., Washington, D. C. In the original complaint in I. C. C. Docket No. 28,020 General Crushed Stone Co., Easton, Pa. *v.* Arcade and Attica, *et al,* the rates on crushed stone from Akron, N. Y., to destinations in Ohio and Pennsylvania are allegedly in violation of sections one and three with preference being for competitors located at Buffalo, Bowmansville, and Cheektowaga, N. Y., and at Annadale, Branchton, East Brady, Hillsville, Shaw Junction, Walford, Worthington, Pa. New rates are asked for in the petition.

In sub No. 1 to the above complaint, General Crushed Stone Co., Easton, Pa. *v.* Arcade and Attica, *et al,* the same complaint and prayers are made in connection with the rates on crushed stone from N. LeRoy and LeRoy, N. Y., to destinations in New York, Ohio and Pennsylvania. Sub No. 2, LeRoy Crushed Lime Stone Corp., LeRoy, N. Y. *v.* Arcade and Attica, *et al,* also covers the rates from LeRoy, N. Y., to the same destinations. Sub No. 3, Genesee Stone Products Corp., Stafford, N. Y. *v.* Arcade and Attica, *et al,* covers rates on crushed stone from Stafford to the same destinations.

Sand—Alleging the rate on sand from Humaston, N. Y., to Hills Grove, R. I., of $3.90 a net ton between July 1, 1935 and August 30, 1936 unreasonable to the extent it exceeded $2.85 reparation is requested in a complaint filed by Abner Pollock, 1148 Manor Ave., New York, N. Y., in I. C. C. Docket No. 28,025, Rhode Island Malleable Iron Works, Hills Grove, R. I. *v.* N. Y. C., *et al.*

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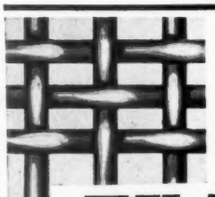

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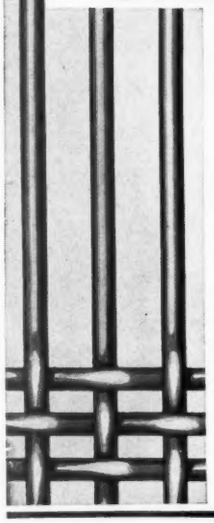

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Occupational Diseases and the Law

Working Conditions; "Fraud"

In the case of *Miller, Administratrix v. United States Gypsum Co.,* decided April 4, 1938, the U.S. Circuit Court of Appeals, 2nd Circuit, follows earlier decisions to the effect that in a suit charging an employer with liability for failing to furnish a safe place to work, an allegation of fraud (in representing the factory as a safe place to work) is superfluous and not pertinent to the action; that an earlier judgment, based on the alleged failure to furnish a safe place to work, was a bar to a later action alleging such "fraud."

The employee himself commenced an action against the company in 1935, to recover damages for injuries resulting from silica dust inhaled in the defendant company's factory; that suit was dismissed on the ground that it was barred by the statute of limitations. An appeal was dismissed in 1936, and a second action begun shortly thereafter, but the employee died before process was served. The present suit was instituted by the administratrix of the employee's estate; it was dismissed by the lower court on the ground that it also was barred by the statute of limitations.

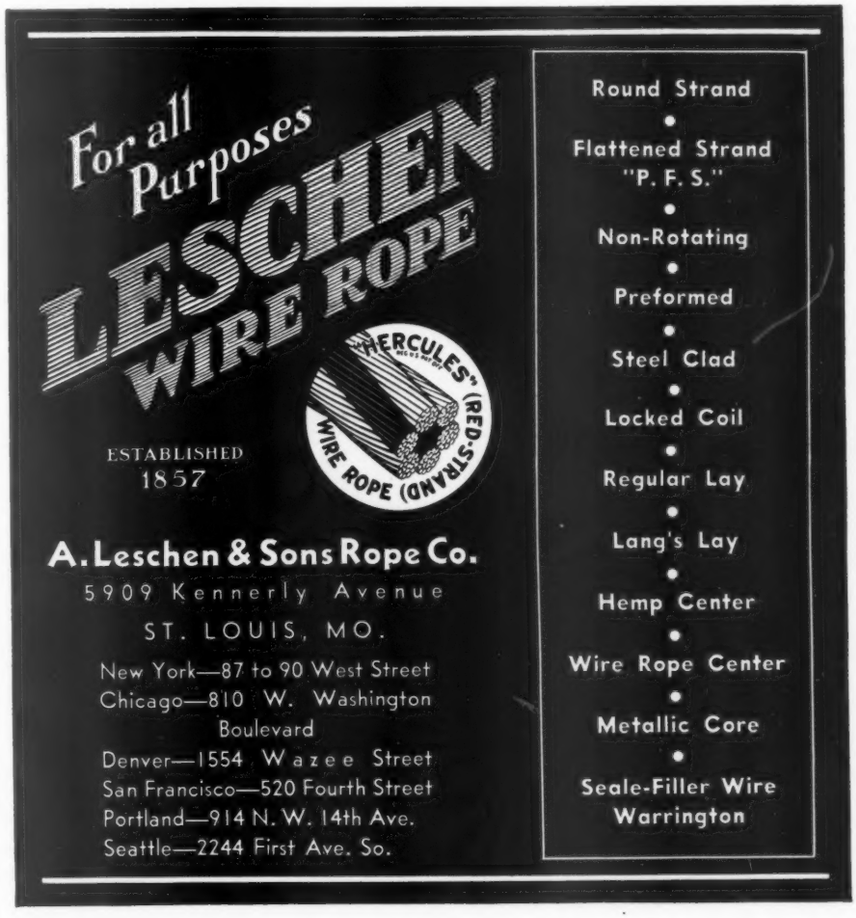
The only question before the appellate court was the propriety of dismissing the count of "fraud"—it being charged that the company knew that harmful dust, gases and fumes were disseminated in the atmosphere, but wilfully kept the employee in ignorance of such facts and represented to him that the factory, work places, processes and employment were safe and free from hazards to health; that the employee learned on or about July 23, 1934, that the dust, gases and fumes were in fact unhealthful. It was contended that the statute of limitations did not operate with regard to this count until the discovery of the "fraud" on July 23, 1934. The Court holds, however, that the earlier judgment was a bar to all causes of action asserted in the amended complaint, and that the allegations in the count of "fraud" do no more than to charge the company with liability for failing to furnish a safe place to work. In the latter point, the decision follows *Schmidt v. Merchants Despatch Transportation Co.,* 270 N.Y. 287, 200 N.E. 824, and *Michalek v. United States Gypsum Co.,* 78 Fed. (2d) 115, reversed on other grounds, 298 U.S. 639.

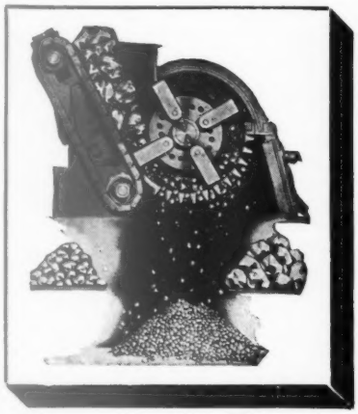
Partnership; Silicosis

Montello Granite Co. v. Industrial Commission et al., decided by the Wisconsin Supreme Court on March 15, 1938. In this case the state supreme court affirms a decision of the circuit court below to the effect that a group of former employees of the company did not constitute a partnership or an independent contractor, and that hence the company was not exempt from liability to pay compensation. The plant was closed down at the end of December, 1932, because it could not be operated profitably on account of the cost of compensation insurance. The company then leased to a so-called partnership of its former employees all of its property, tools and equipment, except its offices and power plant. The partnership contracted to sell its entire output to the company, but to all intents and purposes the plant was operated exactly as it had been before the shut-down. The workmen were paid directly by the company, but the partnership twice a month received the exact amount which the members had earned under the wage scale adopted, and each member then received the exact amount which he had earned.

The court holds that under all of the circumstances involved, the relation was that of employer and employes and that the company is liable to payment of compensation. The profits in which a partner is to share must be real profits, not wages. The whole set-up, considered in connection with the manner of operating the plant under it, is here regarded as a scheme to circumvent the compensation act. Numerous facts distinguish this case from *York v. Industrial Commission,* 269 N.W. 726.

The workmen involved in the suit were suffering from silicosis. Although neither of them suffered a wage loss before he was discharged, the evidence shows that they acquired the disease while employed by the company, the court holds that compensation is due them because of their actual disability, i.e., physical incapacity to work, which is distinguished from actual wage loss. To hold otherwise, in the opinion of the court, would deny compensation to an employee who had been discharged because of an





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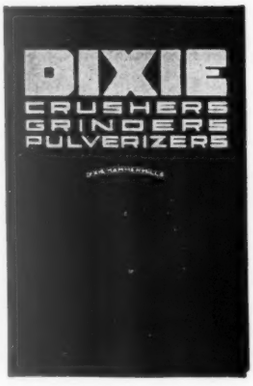

DIXIE MACHINERY MFG. COMPANY

4209 Goodfellow Ave., St. Louis, Mo.

occupational pathological disability and who at the time of his discharge had suffered no actual wage loss, but who, because of the disease, had subsequently found it impossible to obtain or to perform other work, and would defeat the intention of the Legislature.

The findings of the Industrial Commission are modified as to the dates compensation commences. Although disability may be referred back to the last day of work for the last employer whose employment caused the disability (and the Commission had done so in this case), the statute deos not contemplate that compensation be paid as a matter of course from such last day of work.

Common-Law Action

Jenkins v. American Enka Corp., decided April 5, 1938, by the U. S. Circuit Court of Appeals, 4th Circuit (North Carolina). In this suit the employee alleged that his health had become seriously and permanently impaired because of unhealthy working conditions in the company's plant. The company denied that the working conditions were unhealthy and set up that the employee had agreed to be bound by the North Carolina Workmen's Compensation Act. The Court holds that the rights and remedies given to an employee under that Act excluded all other remedies against the employer for the negligence of the employer, following the decisions of the North Carolina Supreme Court in the cases of *McNeely v. Asbestos Co.*, 206 N.C. 568, 174 S.E. 451; *Swink v. Asbestos Co.*, 210 N.C. 303, 186 S.E. 258; *Conrad v. Foundry Co.*, 198 N.C. 723, 153 S.E. 266; and *Lee v. American Enka Corp.*, 212 N.C. 461, 193 S.E. 809.

No Recovery Allowed

Piskornik v. Hudson Motor Car Co., decided by the Michigan Supreme Court, June 7, 1938. This case was based on lead poisoning alleged to have been acquired by the employee while in the defendant company's employment. Both the company and the employee were under the provisions of the Michigan Workmen's Compensation Act, and the Court holds that the facts and the questions of law are identical with the earlier cases of *Cell v. Yale & Towne Mfg. Co.*, 281 Mich. 564, 275 N.W. 250, and *Thomas v. Parker Rust Proof Co.*, decided on May 4, 1938. Under these decisions, there is no recovery at common law under the circumstances involved.

SECO

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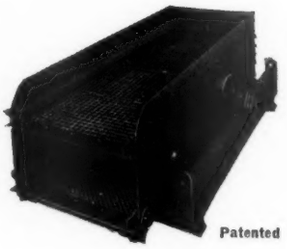

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New Machinery and Supplies

• Blasting Caps

Atlas Manasite blasting caps and electric-blasting caps are announced by the Atlas Powder Co. as representing a real advance in safety for all users of explosives. The company points out that no detonator should properly be called "safe" as it is intended to set off explosives.

The new Manasite detonators, however, substantially increase the margin of safety in handling explosives. This new and exclusive development is the result of several years of research by Atlas labatories. Manasite detonators contain a new initiating compound known chemically as "hexanitromannite." As used in the new detonators, this compound is much less sensitive to impact and friction than detonating compounds commonly used. Full detonating power and other advantages are maintained. Extensive field tests have already proven the excellent performance and increased safety of these blasting caps.

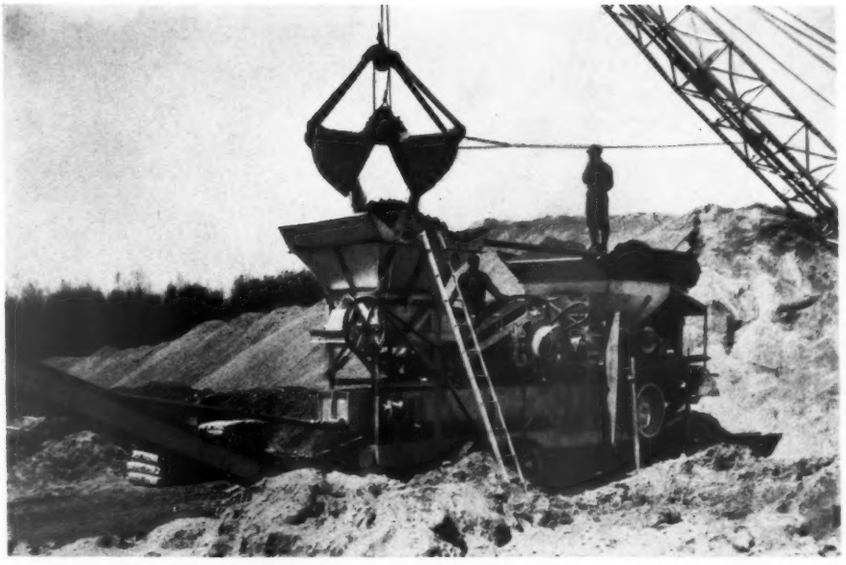
• Stabilizer Plant

The new Cedar Rapids stabilizer plant for mixing clay-soils, aggregates, calcium chloride, salt, etc., has been announced by the Iowa Manufacturing Co. of Cedar Rapids, Ia. After several years of extensive study as to the mechanical requirements of a stabilizer plant, the company claims this new plant, with its many distinct features, is adaptable to all general operating conditions and performs with efficiency and economy.

A few of the outstanding features are: positive non-clogging clay-soil feeder, accurate proportioning devices, low operating height, a self-contained, highly portable unit, large capacity and low operating costs.

The plant consists of one main truck unit, pneumatic tired, on which is mounted the various processing units. Because the plant setup is generally made at stock piles, the stabilizer plant is designed for clam shell feeding with large receiving hoppers above both the aggregate and clay-soil feeders. The finished mix is discharged onto a delivery conveyor which can be designed for direct truck loading or delivery to a storage loading hopper or bin.

The recently announced Pacific detachable-drill-bit grinder is an important new development of the Alloy Steel & Metals Co., 1862 E. 55th St., Los Angeles, and is described in an attractive folder available by writing the manufacturer. This new device can be easily installed on present grinding-wheel equipment in the shop without needing any special form wheels. It can be used by any handy man for quick, accurate resharpening of all standard makes of rock bits up to 3 in. in diameter. Its simplicity and low cost make this tool particularly suitable for drill operators.



Portable plant for producing stabilized road materials.

Aggregates are fed through the aggregate feeder in predetermined quantities direct to the pugmill. The clay-soil is fed by mechanical screws to the short belt conveyor leading to the disintegrating crusher where the clay-soil is processed to specifications and then discharged to the pugmill. A separate calcium chloride or salt feeder is used to introduce these items and so designed so the feed is in constant proportion to the balance of the materials according to specifications. The mixing is done in a long single shaft pugmill which can be raised or lowered from the horizontal operating plane as required to secure the best mix.

The entire plant is operated from one power unit which can be either gas or Diesel, at the option of the purchaser.

• Excavator

The Lima Locomotive Works, Inc., Lima, O., announces a new convertible ¾-cu. yd. shovel, dragline, crane and pull-shovel known as the Paymaster . . . the name given to the new machine by virtue of a contest conducted at the 1938 Road Show. When equipped as

The Paymaster excavator.

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
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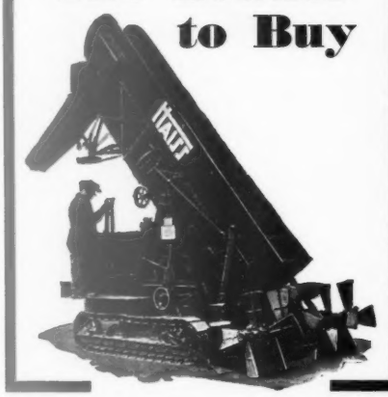

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Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Conveyors — Clamshell Buckets

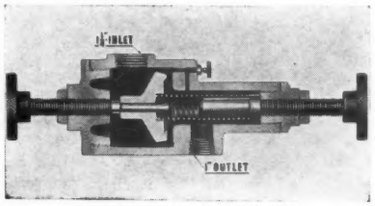
a clamshell or dragline, capacity depends upon length of boom and material to be handled. When equipped as a crane, it has an 11-ton capacity. It is exceptionally fast with ample strength to give steady, dependable service. As a shovel it is equipped with an 18-ft. boom and 15-ft. dipper handle. Standard crane boom is 35 ft. however, inserts can be added to make a 50-ft. boom.

Anti-friction bearings are used at all important bearing points, including drums. The rotating base is a one-piece casting with machinery supports mounted with finished bolts and spot-welded. Swing and travel clutches are the double cone, friction type, amply ventilated.

The boom is of all-steel box type construction, welded throughout. The cab is pleasingly streamlined with in-built winter front, approximately two-thirds of the area of the cab can be opened for ventilation in hot weather. Ample vision can be had from any angle.

• Safety Air Valve

An automatic shut-off valve to be placed in the supply line above flexible hose used to convey compressed air, etc., that immediately shuts off the supply when there is a break in the hose



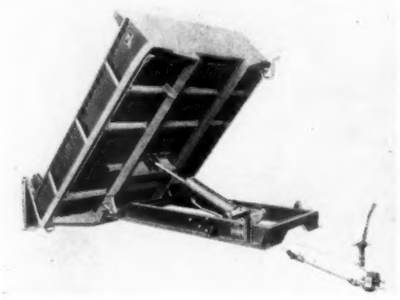
Safety vale for air lines.

or it becomes disconnected is now being manufactured by D. J. Murray Mfg. Co., Wausau, Wis., and sold under the trade name "Murray-Lorge." A cutaway view of the valve is shown here. The valve operates on the principle of equalization—that as long as the pressure at the inlet and the outlet are nearly, or exactly the same, the plunger is maintained in an open position by means of a spring, permitting the air, steam, or other supply to flow around it in a normal manner. The plunger may be adjusted to automatically shut off the flow at any desired pressure at the inlet, or size of break at or below the outlet. This valve is designed as a safety appliance to promote the efficient use of tools wherever flexible hose is used; it is compactly built and may be used indefinitely without attention.

• Dump Body

One of the many new 1938 re-designed Gar Wood units is the Model D6 direct-lift hoist, shown here.

The dumping angle has been increased and the mounting height lowered. The D6 hoist has a 6-in. bore with 16¾ in. stroke, and is



Truck body with direct-lift hoist.

specially designed for Gar Wood type C bodies. All four sides of the body tail-gate are flanged into a box-shape, affording additional strength with less weight. Engineering simplicity is one of the achievements attained in the new line, according to Sales Manager Hammond, hoist and body division, Gar Wood Industries, Inc., Detroit, Mich.

• Concreting Machine

The Crete-Mobile, recently announced by the Hercules Steel Products Co., Galion, O., is a complete unit for mixing concrete and placing it pneumatically, installed on a standard 1½-ton truck. The equipment consists of a 105-cu.ft. two-stage air compressor driven directly from the truck motor by a Hercules split-shaft power take-off.

The compressor is mounted at the rear of the cab, a water tank is suspended immediately to the rear of the compressor and a mixing tank and cement motor is placed at the rear of the truck chassis. An air hose extends from

The portable mixing-and-placing machine.

An Easton 8-cu.yd. Phoenix dump-truck body discharging a load of stone to crusher at the plant of the Weston & Brooker Co., at Camak, Ga.

the air receiver tank to the air motor, which forces the sand and cement through the hose, at the end of which is a nozzle attachment. At this nozzle water under approximately 40-lb. pressure is allowed to enter. The water hydrates the cement and sand. The mixture, which has been hydrated, is then shot from the nozzle to the point desired.

Concrete 1½ in. thick, covering 10 sq.ft. can be placed per hour with his machine, according to the manufacturer.

• Tractor Shovel

Four new models of mechanically-operated combination shovel attachments for Case, Farmer's Co-op., Fordson and International tractors have been announced by the General Construction Equipment Co. of Elkhart, Ind.

Extendable digging or loading and lifting arms, make it possible to dig or excavate, load, transport, backfill or hoist with but one machine, by a simple change of attachment, without disturbing the main structure.

The power is taken from the front end of the crankshaft by a special hub hook-up, and transmitted through a double roller chain, to the control mechanism, mounted above the engine housing, thereby giving the attachment independent operating of the tractor movement and insuring perfect flexibility.

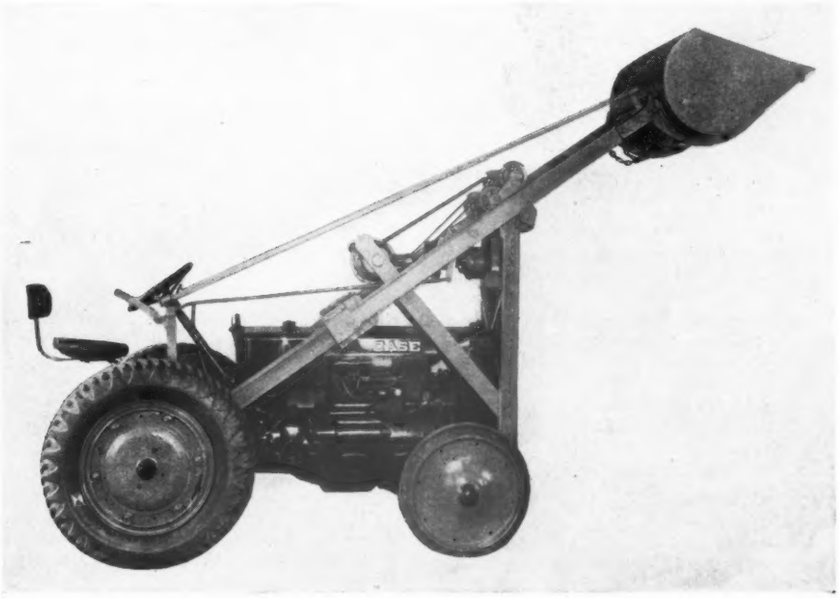
These new simplified attachments make it possible to dig close to the tractor, and with the sliding extendable control arms moving upward to the height of the front standards (approximately 6 ft.) then outward and still farther upward permit the shovel to be dumped in the truck, more than 3 ft. forward of the tractor, at a height of from 7 ft. 6 in. to 8 ft. 4 in.

The standard shovel is of ½ cu.yd. capacity, controlled with a cam latch, no fingers, on an independent lever close to the driver.

• Portable Elevator

A new portable hoist and material elevator, equipped with scales for proportioning material into ready-mixed concrete trucks, has been announced by the Concrete Transport Mixer Co. According to the company two men can assemble or take it down in about an hour.

The hopper has a capacity of 2,000 lb. of dry material and ½ cu.yd. of concrete. Discharge can be regulated and controlled by means of the undercut type of gate. Scales



Excavating attachment mounted on a tractor.

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Problems of digging and hauling materials distances from 100 to 1500 ft. are solved most cheaply with Sauerman Drag Scraper or Slackline machines.

The first cost of a Sauerman machine is less than that of any other equipment of equal range and capacity. Moreover, the machine is easy to operate and maintenance expense is small.

Many examples of pit and bank excavation, river dredging, stripping, overburden, stockpiling and reclaiming—showing costs as low as 3c per ton handled—are illustrated in the Sauerman catalog. Write for this book.

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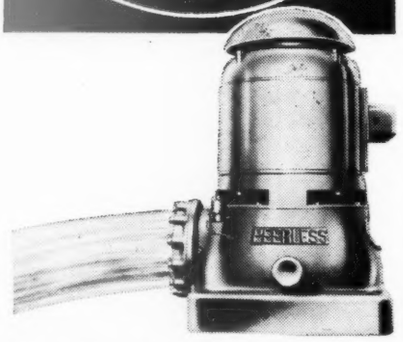

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Portable elevator ready to discharge a batch into waiting mixer truck.

are standard equipment on the chassis for weighing aggregates when batching.

Additional sections may be added to the tower to bring its height to 60 ft. for hoisting purposes.

• Pumping Unit

A new lightweight self-priming, centrifugal pump is the Barnes "Bee"—a 55-lb. unit of many uses. The Barnes Manufacturing Co., of Mansfield, O., is now in production on the

The small, self-priming pump with built-in gasoline engine.

new pump and is securing wide distribution through agents and dealers all over the country.

The Barnes "Bee" is powered by either a Briggs & Stratton gasoline engine or a General Electric motor and can be carried by hand to any job requiring quick removal of water.

The price is said to be the lowest ever quoted for a unit of this type—$65.00 with gasoline engine, $80.00 with electric motor.

Air-drill hose, constructed with an inner tube of gasoline and oil-resistant synthetic rubber, for use on air compressors and in other service where oil is present in the line, has been perfected by The Manhattan Rubber Mfg. division of Raybestos-Manhattan, Inc., Passaic, N. J.

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Facts and Figures for Aggregates Producers. 48 p. Pioneer Engineering Wks., Minneapolis, Minn.

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ANNSVILLE SAND & GRAVEL CORP., Annsville, N. Y. Capital, $20,000. Nelson Craven, Peekskill, N. Y.

MODERN CONCRETE PRODUCTS CO., INC., Miami, Fla. 50 shares, n.p.v. R. H. Ward, B. Rodringer and S. C. Lohmeyer, directors.

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The construction industry is noted for its forwardness in the adoption of new methods and equipment. That is why so many contractors are using TIMKEN Rock Bits in place of forged steels. They have proved that TIMKEN Bits do a better job in less time—save money.

HIAWATHA, Timken Bearing Equipped streamlined flyer of the Milwaukee Road

If you are still using forged steels you are behind the times. TIMKEN Rock Bits will bring your rock drilling up to the same high standard of efficiency that you insist upon in your other operations.

TIMKEN Bits drill faster and last longer because they are made of TIMKEN Steel deep hardened to stand up under the continual pounding of the drills and the abrasive effects of the toughest rock. The removable feature eliminates forging, saves the drillers' time, cuts transportation costs to and from the job and greatly reduces the total number of steels required, thus sharply curtailing your steel investment.

Give TIMKEN Bits a reasonable trial. You'll find it *pays* to use them. Write for name of nearest distributor.

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Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

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A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Dracco Corp.
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Co.

Air Pumps
Gardner-Denver Co.

Air Separators
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co., Inc.
Lime & Hydrate Plants Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W. W.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
Chicago Steel Fdry. Co.
Frog Switch & Mfg. Co.
Manganese Steel Forge Co.
Stulz-Sickles Co.

Arresters (Lightning)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Ash and Refuse Handling Equipment
Allen-Sherman-Hoff Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Automatic Feeders
Bradley Pulverizer Co.
*Fuller Company
*Hardinge Co., Inc.
*Link-Belt Co.
Schaffer Poidometer Co.

Automatic Weighers
*Blaw-Knox Co.
*Fuller Company
*Jaeger Machine Co.
Schaffer Poidometer Co.

Backfillers
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
Continental Roll & Steel Fdy. Co.
*Lima Locomotive Works
Northwest Engineering Co.

Balls (Grinding)
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
Carnegie-Illinois Steel Corp.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Barges (Steel)
*Chicago Bridge & Iron Co.
*Manitowoc Engineering Works

Bases (Trolley)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Batteries
*General Electric Co.

Battery Charging Equipment
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Bearing Metals
*Westinghouse Electric & Mfg. Co.

Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Micarta)
*Westinghouse Electric & Mfg. Co.

Bearings (Roller)
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacings
Flexible Steel Lacing Co.

Belting
*Cincinnati Rubber Mfg. Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Quaker City Rubber Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Belting (Multiple V)
Republic Rubber Co.

Belts (Fan)
Quaker City Rubber Co.
Republic Rubber Co.

Bin-Dicators
Bin-Dicator Co.

Bin Gates
Allen-Sherman-Hoff Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
*Austin-Western Road Machy. Co.
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Universal Crusher Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.
*Ensign-Bickford Co.

Block Machines (Concrete)
Dunn Mfg. Co., W. E.
Hollostone Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Block Machines (Power Press, Concrete)
Dunn Mfg. Co., W. E.
Hollostone Co.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Blocks (Sheave)
*Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

Blowers
American Air Filter Co.
*Sly Mfg. Co., W. W.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Jaeger Machine Co.

Boilers
Babcock & Wilcox Co.

Borings (Core)
Holtman Bros. Drilling Co.
Pennsylvania Drilling Co.

Breakers (Circuit)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Brick Machines (Concrete)
Dunn Mfg. Co., W. E.
Hollostone Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co., W. E.
Stearns Mfg. Co.

Bronze Work (Ornamental)
National Wire Cloth Co.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Owen Bucket Co.
Wellman Engineering Co.

Buckets (Dump)
*Brooks Equip. & Mfg. Co.
*Jaeger Machine Co.
*Dempster Bros. Inc.

Buckets (Dragline—Cableway)
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Wellman Engineering Co.

Buckets (Elevator and Conveyor)
Chicago Steel Fdry. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Screw Conveyor Corp.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
Athey Truss Wheel Co.
*LeTourneau, Inc., R. G.

Bulk-Cement Storage Plants
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Sprout, Waldron Co.

Bulldozers
*LeTourneau, Inc., R. G.

Burners (Oil)
Babcock & Wilcox Co.

Cableways
Leschen & Sons Rope Co., A.
*Link-Belt Co.
*Roebling's Sons Co., John A.
*Sauerman Bros., Inc.

Capacitors
*Westinghouse Electric & Mfg. Co.

Caps (Blasting)
Atlas Powder Co.

Caps (Blasting, Electric)
Atlas Powder Co.

Capstans (See Winches and Capstans)

Car Control Systems
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Car Dumpers
*Link-Belt Co.
Wellman Engineering Co.

Car Pullers
*Link-Belt Co.

Car Wheels — (See Wheels — Car)

Carriers
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
*Austin-Western Road Machy. Co.
*LeTourneau, Inc., R. G.

Cars (Block, Concrete)
Multiplex Concrete Machinery Co.

Cars (Quarry and Gravel Pit)
*Austin-Western Road Machy. Co.

Castings
Babcock & Wilcox Co.
Chicago Steel Fdry. Co.
*Eagle Iron Works
Frog Switch & Mfg. Co.
*Hardinge Co., Inc.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan & Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Chutes and Chute Liners
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.

Classifiers
Bradley Pulverizer Co.
*Deister Machine Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Norberg Mfg. Co.

Cleaners (Oil)
Precision Engineering Co.

Clips (Wire Rope)
Leschen & Sons Rope Co., A.

Clutches
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Breakers (Air)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.

Concrete Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.

Condensers
*Chicago Pneumatic Tool Co.
*Westinghouse Electric & Mfg. Co.

Cones (Sand-Washing)
*Chicago Bridge & Iron Co.
*Link-Belt Co.
Smith Engr. Works

Controllers (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Converters (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
*Barber-Greene Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
*Barber-Greene Co.
Chicago Steel Fdry. Co.
*Dracco Corp.
*Fuller Company
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Screw Conveyor Corp.
Smith Engr. Works

* See also information in the 1938 Pit and Quarry HANDBOOK.

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● Williams Buckets don't rely on sheer mass and dead weight for digging power and stamina. Williams welded construction cuts down weight without sacrifice of power and durability.

Williams power mechanisms give the bucket tremendous digging ability. They bite quickly and deeply to get full capacity loads—they work faster—get the job done quicker because you are moving dirt—not inert metal.

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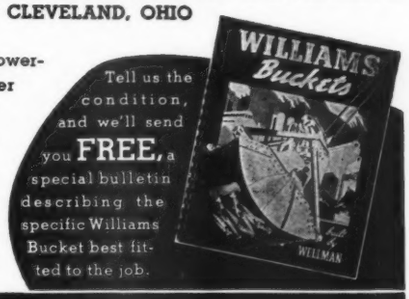
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You are assured of efficient, dependable and economical operation when using Eagle Sand and Gravel Washers, single or twin screw. Gives you greater capacity which speeds up production. More scrubbing action produces cleaner sand and gravel to meet rigid specifications which means greater profits. Eagle Washers operate smoother and are sturdily constructed for years of service. Write for Bulletin covering Eagle Washers.

This is the Single Screw Eagle Washer. The Twin Screw Washer is recommended for those with exceptionally large capacity requirements.

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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Universal Crusher Co.

Conveyors (Pneumatic)
*Dracco Corp.
*Fuller Company

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors (Screw or Spiral)
Screw Conveyor Corp.

Coolers (Clinker)
*Allis-Chalmers Mfg. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

Couplings (Hose)
*Chicago Pneumatic Tool Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Lima Locomotive Works
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engineering Co.

Crusher Hammers
Electric Steel Foundry Co.

Crusher Parts
Alloy Steel & Metals Co.
*American Pulverizer Co.
Frog Switch & Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bradley Pulverizer Co.
*Brooks Equip. & Mfg. Co.
Carnegie-Illinois Steel Corp.
*Dixie Machinery Mfg. Co.
Electric Steel Foundry Co.
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.
Sturtevant Mill Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
Alloy Steel & Metals Co.
*Austin-Western Road Machy. Co.
Bacon, Inc., Earle C.
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
Alloy Steel & Metals Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
*Brooks Equip. & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutter Heads (Dredging)
*Eagle Iron Works

Detonators
Atlas Powder Co.

Diaphragms
Quaker City Rubber Co.

Diesel Engines (See Engines—Diesel)

Dipper Parts
Frog Switch & Mfg. Co.

Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
Frog Switch & Mfg. Co.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Lima Locomotive Works
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engineering Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bits
*Chicago Pneumatic Tool Co.

Drill Sharpening Machinery
Alloy Steel & Metals Co.
Gardner-Denver Co.

Drill Steel
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.

Drilling Accessories
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand Hammer)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

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*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Drills (Water Well)
*Bucyrus-Erie Co.

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Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.
*Westinghouse Electric & Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
*Chicago Bridge & Iron Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
Lime & Hydrate Plants Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dust Arresters
American Air Filter Co.
*Blaw-Knox Co.
*Dracco Corp.
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Air Filter Co.
*Blaw-Knox Co.
*Dracco Corp.
*Parsons Engineering Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
American Air Filter Co.
*Blaw-Knox Co.
*Dracco Corp.
*Fuller Company
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Filters
American Air Filter Co.
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dust Masks
Chicago Eye Shield Co.

Dynamite (See Explosives)

Dynamos
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*General Electric Co.

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Stulz-Sickles Co.

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Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bradley Pulverizer Co.
*Fuller Company
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
Wellman Engineering Co.
*Westinghouse Electric & Mfg. Co.

Engine Generator Sets
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Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of The National Supply Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of The National Supply Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
Atlas Powder Co.

Fabricating (Electric Arc and Oxy-Acetylene)
Stulz-Sickles Co.

Fans (Exhaust)
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feed Water Heaters
*Westinghouse Electric & Mfg. Co.

Feeders
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Fuller Company
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Westinghouse Electric & Mfg. Co.

Filters (Oil)
Precision Engineering Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
Atlas Powder Co.
*Ensign-Bickford Co.

Fuses (Electrical)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Galvanometers
*Westinghouse Electric & Mfg. Co.

Gas Producers
Wellman Engineering Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gear Motors
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Gears (Herringbone)
*General Electric Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

Gears and Pinions
*General Electric Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

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Generator Sets (Engine)
*General Electric Co.
National Supply Co. of Del.
Superior Diesel Engine Division of the National Supply Co.
*Westinghouse Electric & Mfg. Co.

Generator Sets (Motor)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Generator Sets (Turbine)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Goggle Parts
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Goggles
Chicago Eye Shield Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
Owen Bucket Co.

Grating (Steel)
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Traylor Engr. & Mfg. Co.

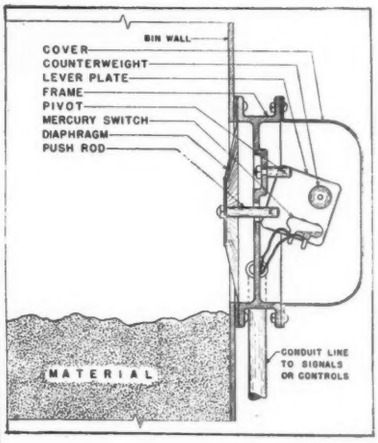
Grizzlies
*Allis-Chalmers Mfg. Co.

*See also information in the 1938 Pit and Quarry HANDBOOK.

BIN LEVEL CONTROL

For bulk materials, semi-liquids, liquids.

CEMENT MAKER CONTROLS WEIGHING



A cement maker mounted one of our Bin-Dicators on a small supply bin over his automatic scales. He connected its mercury switch to start the weighing operation each time the bin filled to a certain point. It has been in service for 20 months, has operated 177,753 times to the day we took the record. It has needed no attention and needs none now. You can apply the Bin-Dicator on your own storage bins and hoppers to signal level of dry, wet or liquid materials, to operate filling, emptying, weighing equipment. Actuation is by varying material weight on the diaphragm shown in the illustration.

MAY WE GIVE YOU DETAILS FOR YOUR STORAGE BINS?

THE BIN-DICATOR COMPANY
14615 East Jefferson Avenue **Detroit, Mich.**

Put LINK-BELT Experience into your Screen Installation

● Profit by the ideas gained from thousands of practical cost-cutting installations handling all kinds of materials, such as sand, gravel, crushed stone, coal, coke, clay, fertilizer, lime, ores, grain, sugar, chemicals, pulpwood chips, etc.

Submit your screening problems to Link-Belt. Send for Catalog No. 1562.

●

Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, or any of our other offices, located in principal cities.

7300

LINK-BELT *Vibrating* SCREENS

COMPOUND FUNNEL CLASSIFIER

For sizing minus 5/16" gravel and sand, and for cleaning it by washing out silt and other light impurities.

Descriptive Bulletin No. 23

PLAT-O

Improved Heavy Duty

VIBRATIN SCREEN

Built in all standard sizes—in from one to three decks.

Write for Descriptive Bulletin No. 22

DEISTER MACHINE COMPANY
1933 EAST WAYNE STREET **FT. WAYNE, IND.**

KUNTZ SYSTEM

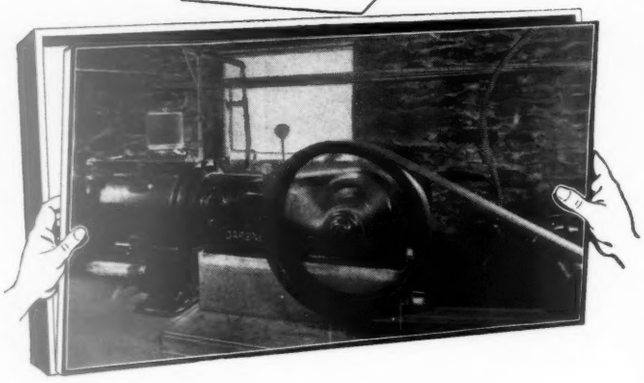
Changes or plant improvements should never be attempted without first consulting a recognized authority. We invite interested operators to call upon us to discuss their production problems. Our service and advice have been extremely helpful to operators whose names will be furnished on request. 30 years' experience as designers, manufacturers and engineers of lime plants exclusively.

LIME & HYDRATE PLANTS CO.
Box 574
York, Pa.
●

A BETTER FIT

FOR YOUR CEMENT MILL AIR NEEDS

GARDNER-DENVER "RX" COMPRESSOR



FITTING
YOUR CAPACITY REQUIREMENTS

"RX" Compressors are available in sizes from 89 to 628 c. f. m. for a 100-lb. pressure. Larger sizes for low pressure and vacuum service.

FITTING
YOUR SIZE OF SPACE

Adaptable to any type drive to fit your floor space.

FITTING
YOUR IDEAS OF POWER SAVINGS

Low horsepower per cubic foot of air delivered.

FITTING
YOUR IDEAS OF DEPENDABILITY

Since 1859

Timken Tapered Roller Main Bearings—rugged construction throughout—Gardner-Denver experience in designing better compressors for cement and quarry use. Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Eagle Iron Works
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
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National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Haulage Systems (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Chicago Eye Shield Co.

Hoists
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
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*Jaeger Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Chicago Bridge & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
*Chicago Pneumatic Tool Co.
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Hose (Fire and Suction)
Quaker City Rubber Co.

Hose (Radiator-Engine Cooling)
Quaker City Rubber Co.
Republic Rubber Co.

Hose Couplings (See Couplings)

Hydrators
Lime & Hydrate Plants Co.

Hydrate Plants (Complete)
Lime & Hydrate Plants Co.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
*Barber-Greene Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Indicators (Bin)
Bin-Dicator Co.

Indicators (Material Level)
*Fuller Company

Industrial Safety Equipment
Chicago Eye Shield Co.

Instruments (Electrical)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Joist and Slab Machines (Concrete)
R & L Concrete Machinery Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
*Chicago Bridge & Iron Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Chicago Bridge & Iron Co.
*Hardinge Co., Inc.
Lime & Hydrate Plants Co.

Kominuters
*Smidth & Co., F. L.

Ladders (Agitating Dredge)
*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

Lenses (Goggle)
Chicago Eye Shield Co.

Lighting
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Lights (Electric, Flood)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Lime-Handling Equipment
*Chicago Bridge & Iron Co.
*Fuller Company
*Hardinge Co., Inc.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Chicago Bridge & Iron Co.
*Hardinge Co., Inc.
Lime & Hydrate Plants Co.
*Traylor Engr. & Mfg. Co.

Lime Kilns
*Chicago Bridge & Iron Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.

Lime Plants (Complete)
Lime & Hydrate Plants Co.

Lime Putty Plants
*Chicago Bridge & Iron Co.

Lime Spreaders
Peoria Steel & Wire Co.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
*Barber-Greene Co.
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Locomotives (Diesel)
Davenport Locomotive Works
*Westinghouse Electric & Mfg. Co.
*Whitcomb Locomotive Co.

Locomotives (Diesel-Electric)
Davenport Locomotive Works
*General Electric Co.
*Westinghouse Electric & Mfg. Co.
*Whitcomb Locomotive Co.

Locomotives (Electric, Gas, and Steam)
Davenport Locomotive Works
*General Electric Co.
*Lima Locomotive Works
*Westinghouse Electric & Mfg. Co.

Locomotives (Gas-Electric)
Davenport Locomotive Works
*General Electric Co.
*Westinghouse Electric & Mfg. Co.
*Whitcomb Locomotive Co.

Locomotives (Oil-Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.
*Whitcomb Locomotive Co.

Locomotives (Storage Battery)
Davenport Locomotive Works
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Trolley-Battery)
Davenport Locomotive Works
*General Electric Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
Frog Switch & Mfg. Co.
Manganese Steel Forge Co.

Manganese Steel Castings
Frog Switch & Mfg. Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Masks
Chicago Eye Shield Co.

Measuring Devices (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Meters
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Mill Liners and Linings
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.

* See also information in the 1938 Pit and Quarry HANDBOOK.

*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Allis-Chalmers Mfg. Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Mixers
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Motor Control
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Motors (Electric)
*Westinghouse Electric & Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Moulds and Forms (Concrete)
Dunn Mfg. Co., W. E.
Hollostone Co.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns —Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Oil Refiners
Precision Engineering Co.

Packings
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Pallets
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Partitions (Wire)
National Wire Cloth Co

Paving Mixers
*Jaeger Machine Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.

Photo-Electric Cells
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe Machines (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe (Welded)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
*Barber-Greene Co.
*Fuller Company
Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Universal Crusher Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
*Barber-Greene Co.
*Gruendler Crusher & Pulverizer Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines —Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

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*Universal Crusher Co.

Powder, (Black, Blasting) (See Explosives)

Power Shovels (See Shovels, Electric, Internal-Combustian and Steam)

Power Tampers (Concrete)
Hollostone Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Power Units (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of the National Supply Co.

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.

Press Machines (Hand, Concrete)
Hollostone Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Proportioning Equipment
*Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Pulleys
Sprout, Waldron & Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Babcock & Wilcox Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
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*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Valves (See Valves Pump)

Pump Valves (Slurry)
Wilfley & Sons, Inc., A. R.

Pumps (Air-Lift)
*Chicago Pneumatic Tool Co.
*Fuller Company

Pumps (Boiler-Feed)
*Westinghouse Electric & Mfg. Co.

Pumps (Bulk Cement)
*Fuller Company

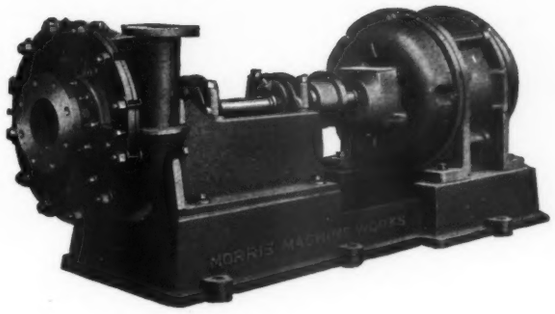
Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth & Co., F. L.

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

The MORRIS HYDRAULIC COLUMN

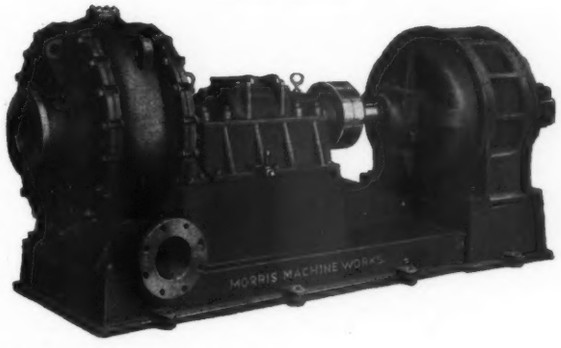
News of interest to Centrifugal Pump Users



Recipe for longevity

—applied to pumps . . . . .

There's an old—and well founded—medical saying that if you want to live long, pick out long-lived grandparents. On that basis alone, the Morris Pumps of today are assured of a long, useful life, for they have the same rugged constitution that has characterized their pump predecessors for more than two human generations. Morris bulletins tell the whole story—write for copies on centrifugal pump types in which you are interested.



Three-strike-outs

and then Morris came to bat . . . . .

It wasn't a ball game, but Morris certainly made a hit. Three other pump manufacturers one after another gave up the job of trying to design a nonclogging pump that would meet required efficiencies, two different conditions of capacity, head, and speed. The pumps designed by Morris did meet the guarantees, and passed the acceptance test with flying colors. More and more, engineers are learning to come to Morris for all their pumping requirements, standard or special.

For authoritative recommendations on any pumping or dredging problem, write to Morris Machine Works, Baldwinsville, N. Y.
Representatives in principal cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works
Peerless Pumps Division of the Food Machinery Corp.
*Westinghouse Electric & Mfg. Co.
Wilfley & Sons, Inc., A. R.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Wilfley & Sons, Inc., A. R.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Wilfley & Sons, Inc., A. R.

Pumps (Slurry)
Wilfley & Sons, Inc., A. R.

Pumps (Sump)
*Chicago Pneumatic Tool Co.
Peerless Pumps Division of the Food Machinery Corp.

Pumps (Turbine)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of the Food Machinery Corp.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Company

Pumps (Vertical)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of the Food Machinery Corp.

Pumps (Well)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of the Food Machinery Corp.

Racks (Curing)
Hollostone Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Ready-Mixed Concrete Plants
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.

Recording Instruments & Meters
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Recuperators
*Manitowoc Engineering Works

Relays
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Remote Control Systems
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Respirator Parts
Chicago Eye Shield Co.

Respirators
Chicago Eye Shield Co.

Rheostats
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Rod Mills
*Hardinge Co., Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

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*Westinghouse Electric & Mfg. Co.

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Chicago Eye Shield Co.

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*Link-Belt Co.

Sand Separators
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works

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Hardinge Co., Inc.

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*Chicago Bridge & Iron Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
Continental Roll & Steel Fdry. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Scrapers (Wagon)
*Bucyrus-Erie Co.
Continental Roll & Steel Fdry. Co.

Screens
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Carnegie-Illinois Steel Corp.
Chicago Perforating Co.
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*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
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Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
*Barber-Greene Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Tyler Co., W. S.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Screw Conveyors
Screw Conveyor Corp.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

Shovels (Electric, Internal-Combustion and Steam)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Lima Locomotive Works
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engineering Co.

Silos
*Chicago Bridge & Iron Co.
*Smidth & Co., F. L.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves (Dredge)
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.

Speed Reduction Units
*General Electric Co.
*Link-Belt Co.
*Westinghouse Electric & Mfg. Co.

Spiral or Screw Conveyors
Screw Conveyor Corp.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
*Link-Belt Co.
*Sprout, Waldron & Co.

Starters (Automatic Motor)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Steel (Alloy)
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Steel (High Tensile)
Manganese Steel Forge Co.

Steel (Open Hearth)
Manganese Steel Forge Co.

Steel Grating (See Grating, Steel)

Steel Plate Construction
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Stokers
Babcock & Wilcox Co.
*Westinghouse Electric & Mfg. Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
*Chicago Bridge & Iron Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
Allen-Sherman-Hoff Co.

Switchboards (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Switches (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Switches (Safety)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Tamp Machines (Hand, Concrete)
Hollostone Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
*Schneible Co., Claude B.
*Traylor Engr. & Mfg. Co.

Tanks (Dewatering)
*Schneible Co., Claude B.

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*Chicago Bridge & Iron Co.

Tanks (Sand-Settling)
*Chicago Bridge & Iron Co.
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*Hendrick Mfg. Co.
*Tyler Co., W. S.

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*Nordberg Mfg. Co.

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*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

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Athey Truss Wheel Co.
*Le Tourneau, Inc., R. G.

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*Allis-Chalmers Mfg. Co.
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Transmission Machinery
*Allis-Chalmers Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Link-Belt Co.

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*Robins Conveying Belt Co.

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*Jaeger Machine Co.

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*Westinghouse Electric & Mfg. Co.

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*Allis-Chalmers Mfg. Co.
*General Electric Co.

Unit Heaters
*Westinghouse Electric & Mfg. Co.

Unloaders (Box Car)
*Barber-Greene Co.
*Fuller Co.
*Link-Belt Co.

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*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Taylor Forge & Pipe Works
Wilfley & Sons, Inc., A. R.

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Vibrating Screen Plate
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

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Vibrators
*Tyler Co., W. S.

Wagon Scrapers
Continental Roll & Steel Fdry. Co.

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Athey Truss Wheel Co.
*Austin-Western Road Machy. Co.
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*Austin-Western Road Machy. Co.
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*Hardinge Co., Inc.
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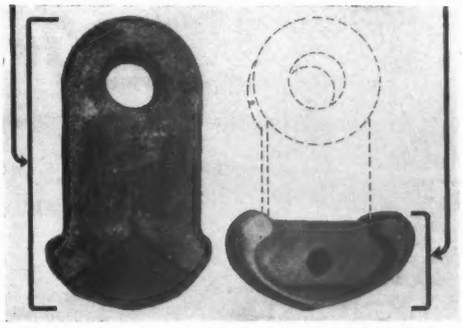

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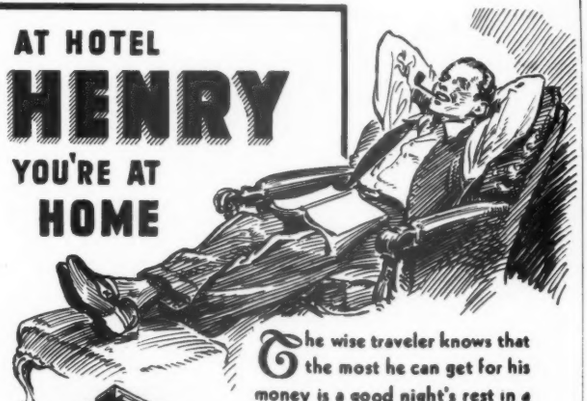

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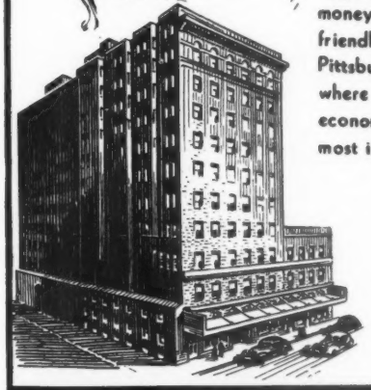

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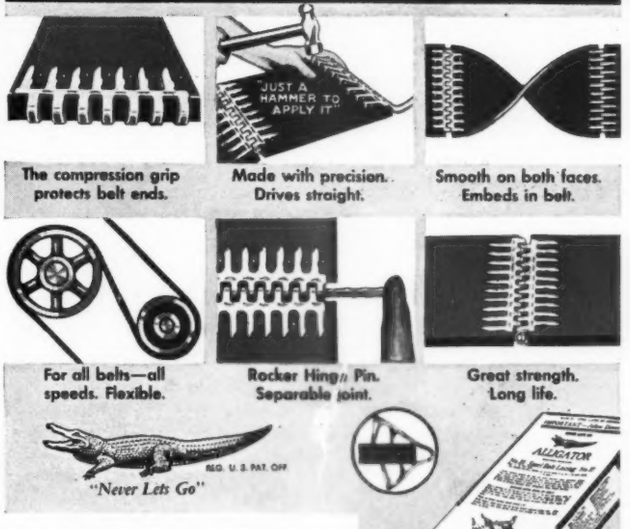
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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Westinghouse Electric & Mfg. Co.

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Wheel Rims (See Rims—Wheel)

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*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Ludlow-Saylor Wire Co.
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*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Leschen & Sons Rope Co., A.

Wire Rope Slings
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Worm Gears (See Gears and Pinions)

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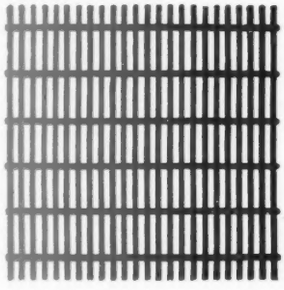
P. O. BOX 52 - - - - - - PEORIA, ILL



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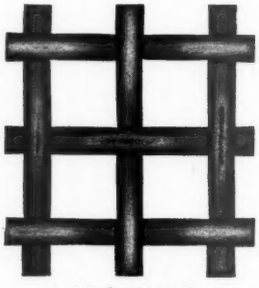

2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
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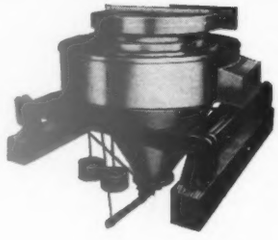
AUTO-VORTEX CLASSIFIER



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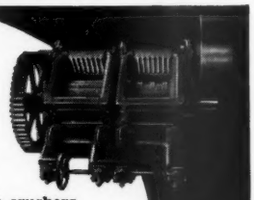

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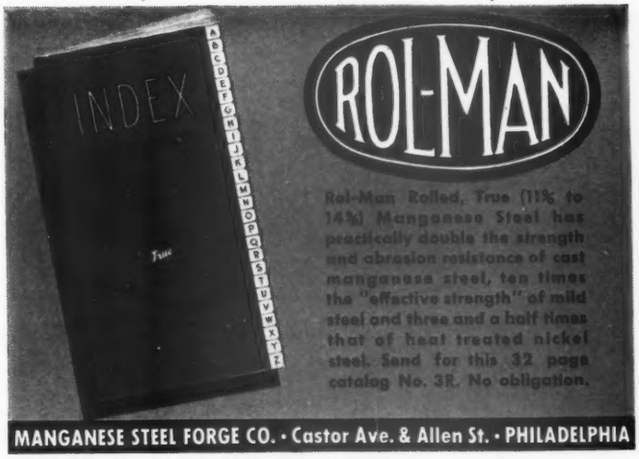
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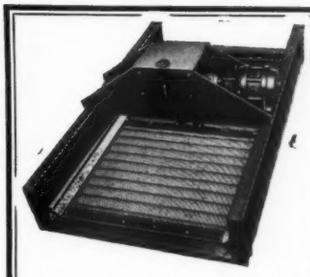
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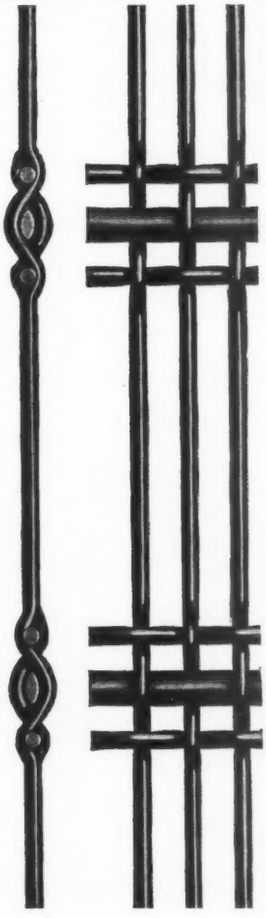
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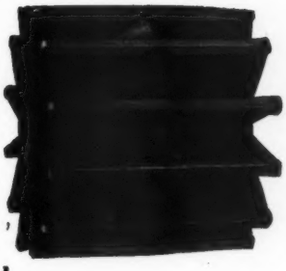
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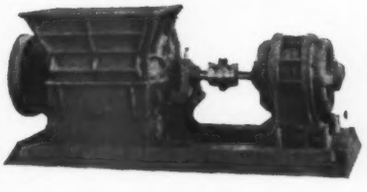
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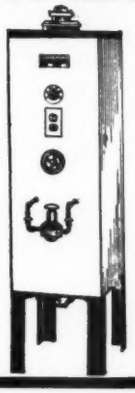

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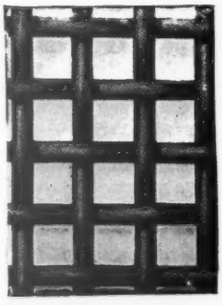

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WANTED

Cash will be paid for good used equipment including pulverizer mill (Raymond or alternative, 2½ ton capacity) dehydration and air separator suitable for processing bentonite. Equipment must bear engineering inspection.

Send replies to Box 720

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3—42x48 Jeffrey Hammer Mills.
2—No. 1 Sturtevant Ring Roll Mills.
1—61x42 & 1—42x42 American Ring Roll Mills.
2—4'9"x40' Heavy Duty Rotary Dryers.
1—4'6"x20' Portable Rotary Dryer.
1—8" Morris Manganese Pump, Ball Bearing.
1—12" Amsco Pump.

All in Excellent Condition—Warehouse Stock
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MACHINERY SALES CORPORATION
Machinery Sales Building
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Rock Crushing plant capacity 2500 tons daily. Prefer large jaw and Symons Cone, Elevators, Screens, Diesel Power Units. Complete Plant or single items considered. Send replies to Box 725

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30" x 42" to 48" x 60".

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One 1¾ yard bucket for Marion No. 37 Shovel. Quote best cash price — advise location and quotation reply to

Box 715

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2 C. P. 664 cu. ft. V. C. Diesel Driven Compressors.

1 B-K-72 Ton-2 Compt. Bin and Batchers.

4 No. 7 Marion Gas-Electric Combination Shovels and Cranes.

2 No. 460—Marion Gas-Electric Combination Shovels and Cranes.

1 4-6 cu. yd. B-K Truck Mixer or Agitator.

1 I. R. No. FM 2 Wagon Drills X 71 Drifter.

2 C. P. No. 100 Wagon Drills.

1 ½ yd. Byers Crane-full revolve-35 ft. Crane Boom and Backhoe attach.

30 2", 3", 4", 6", 10" Gas and Elec. Self-Prime Cent-Pumps.

6 A. C. "35"-Cat. "30" & "60"—Tractors & Bulldozers.

1 International TD 40—Diesel Tractor-Comb. Bulldozer & Angle Blades.

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SAG. 2700

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85 Ton Baldwin 8-wheel switcher with separate tender, 21x28" cylinders.

85 Ton Porter 6-wheel switcher with separate tender, 22x26" cylinders, superheated, A.S.M.E. boiler.

72 Ton American 6-wheel switcher with separate tender, 20x26" cylinders.

60 Ton Baldwin 6-wheel switcher with separate tender, 19x26" cylinders.

55 Ton Baldwin 6-wheel switcher with separate tender, 18x24" cylinders, A.S.M.E. boiler.

50 Ton Baldwin 6-wheel switcher with separate tender, 17x24" cylinders, A.S.M.E. boiler. Four Duplicates.

40 Ton Baldwin 4-wheel switcher with separate tender, 15x24" cylinders.

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Birmingham Alabama

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231 cu. yds. circular bin, steel bolted.
Blaw-Knox 51 tons, two compts., weigh batchers.
Blaw-Knox 72 tons, two compts. volume batchers.
Fuller 155 bbls. cement, electric weigh batchers.

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Gyratory—No. 5 McCully, No. 37 Kennedy Van Saun.

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Troughing rollers and return idlers, 16", 18", 20", 24", 30", 36".
Conveyor belt, 18", 20", 24", 30", 36".
Head and tail pulleys with take ups in any size.
Brand new 24" belt conveyor, steel frame, 65' complete.
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Lima Model 101, crane 50' boom 1¼ yd.
Northwest Model 4 crane and shovel, 1 yd.
P&H Model 600 crane, 1 yd.
Osgood "Conqueror" crane and shovel, 1 yd.
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P&H Model 400 crane and shovel, ¾ yd.
Industrial Brownhoist crane, 10 tons.
Browning truckcrane.

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Gas locomotives from 2½ to 35 tons, 24", 36" std. ga.
Dredge pumps, gas, electric, steam, 6", 8", 10", 12", 16".
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AIR COMPRESSORS — PUMPS

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1½ yd. Northwest Model 6 Gas Shovel.
2½ yd. 75B & 4 yd. 120B Electric Shovels.
2 yd. Northwest Diesel Shovel.

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10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x12, 20x11, 16x36, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 7x12, 30x42, 60x42, 84x66, 36x16 and 9x36.
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No. 5 Telsmith 10x96 Gyratory.
No. 6 BH Traylor Fine Reduction.
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HAMMER MILL

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10 ton American 90 ft. Boom, Guy.
15 ton Clyde 100 ft. Boom, Stiff Leg.

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8 Electric 20, 35, 50, 60 & 100 H.P.

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6'x8' Allen Cone Settling Tanks.
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Nelson Gas Caterpillar Loader.

LOCOMOTIVES

5—Whitcomb 6, 10, and 14 ton Std. Ga.
8—Plymouth & Vulcan 3 to 14 T., 2 & 3 ft. Ga.

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4—SANDERSONS 14 & LOOMIS 44.
7—Ingersoll-Rand Wagon Drills.

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1—Link-Belt K-44 shovel 50' boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
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1—Schramm No. 120 Compressor.
1—1 yd. Owen Bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
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1—Morris 8" dredge pump, 150 h.p. G.E. motor.
1—Morris 10" cent. pump, 2250 GPM at 130' head.
1—Goulds 12" cent. pump, 50 h.p. G.E. motor.
1—Thompson 6" self-priming pump, Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6" self-priming pumps, gas motor.
1—Humdinger 4" self-priming pump.
1—Humdinger 2" self-priming pump.
1—Domestic double diaphragm pump, gas motor.
1—G.E. motor, 200 h.p. slipring.
2—No. 9 B 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

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One 6 inch gravel pump complete with gas motor.
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2—Barber Greene Portable Loaders.

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10—Scraper or Flight Conveyors, 18", 24".

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1—9x8" I.R. ER-1 Air Compressor and motor.

1—7½x6" C-P Air Compressor and motor.

1—24x20" Jeffrey Type "B" Hammer Mill, with 40 H.P. motor.

1—30"x18" Penna. Hammer Mill, ball bearings.

4—4'x5' No. 31 Tyler Hummer Screens.

1—G2 Tyler Generator Set.

30—Horizontal Steel Storage Tanks, 6'x26', 9x18, 20x20.

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1—200 Amp. Westinghouse Flex-Arc Welder.

1—Complete Store Room with Hoists, Packing, Unused Motors from 1 to 40 H.P., stock of Pipe, etc.

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2—18x24" Dings Magnetic Pulleys.

9—No. 160-B Palmer Bee Speed Reducers, 35.2 to 1, 10 H.P.

1—Complete Boiler Plant with 2—422 H.P. B.& W. Stirling Boilers and 2 Wickes Vertical Boilers.

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1—1200 GPM. 8x6 Bucket with motor.

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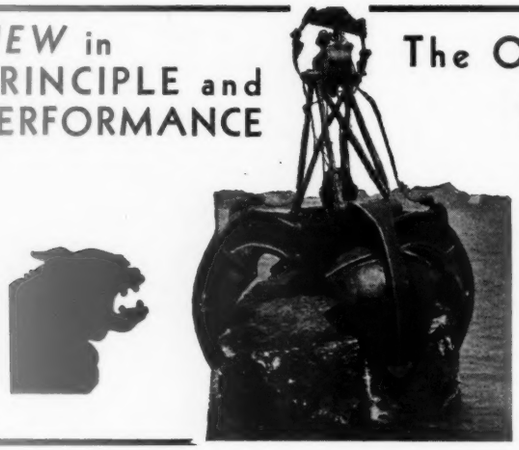

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6050 Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

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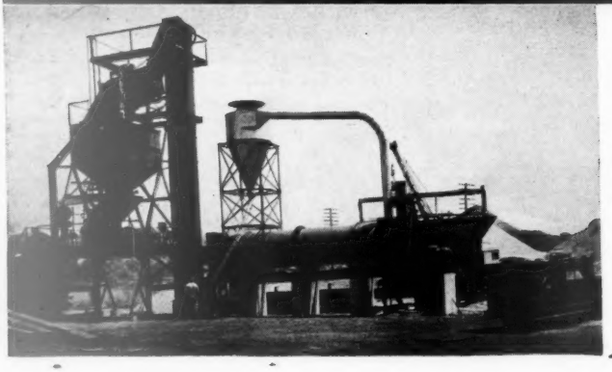

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